BYJU'S EXAM PREP

The Most Comprehensive
Preparation App For All Exams

TRI ANGLE

Part-IV

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11th Jan → Triangle Part 3 9am
Triangle Part 4 11am

12th Jan → Quad Part 3 11am
Quad Part 4 1pm

Agenda ÷ Triangle Part 4

59 min

* Centroid → (50-52) min

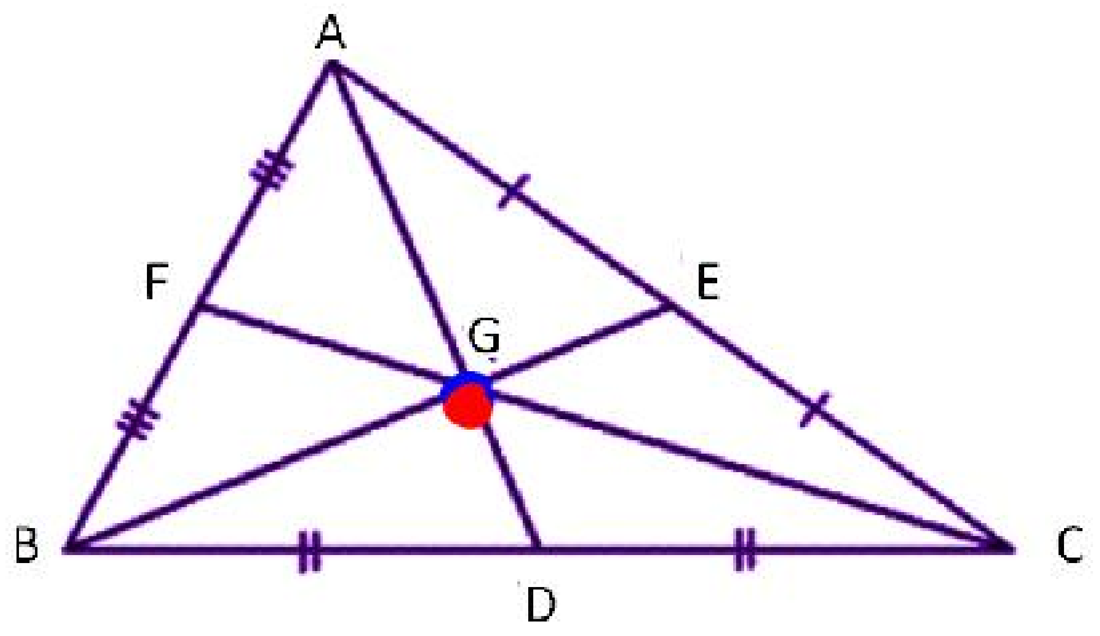
* Incentre → (34-36) min

* Combination of centres → (8-10) min

Homework

CENTROID

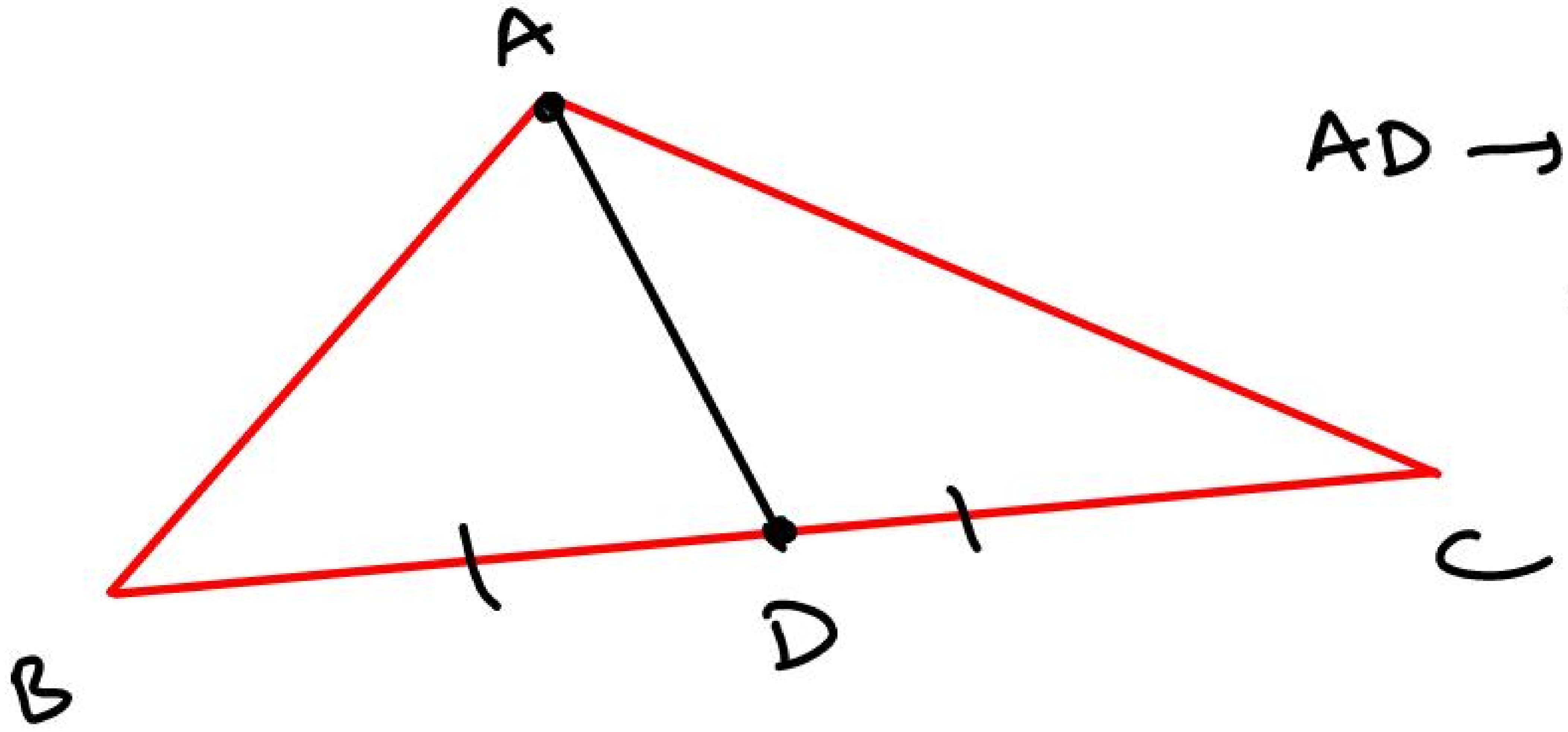
Def: Meeting point of all medians.



Here, G is the centroid of ΔABC.

Median

The line segment which joins one vertex to the mid point of the opposite side.



$AD \rightarrow$ median

$\Downarrow$

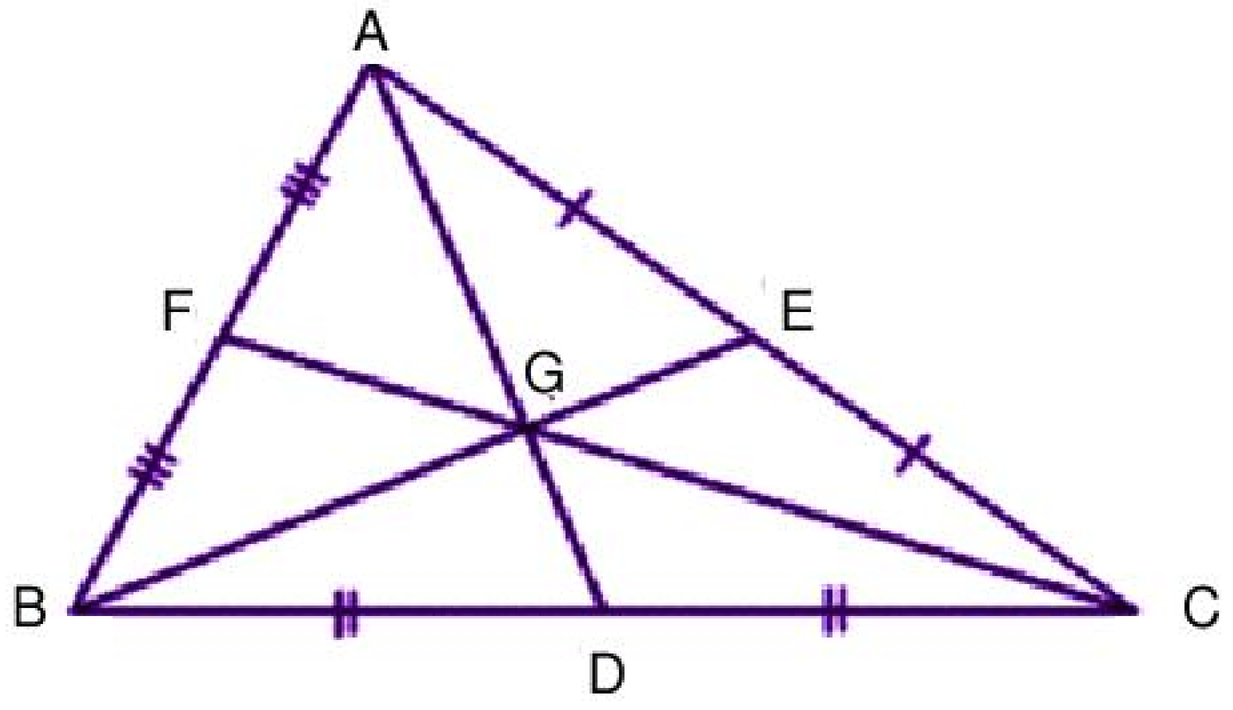
$BD = DC$

1. Centroid divides the median in 2 : 1.

AG : GD = 2 : 1

BG : GE = 2 : 1

CG : GF = 2 : 1



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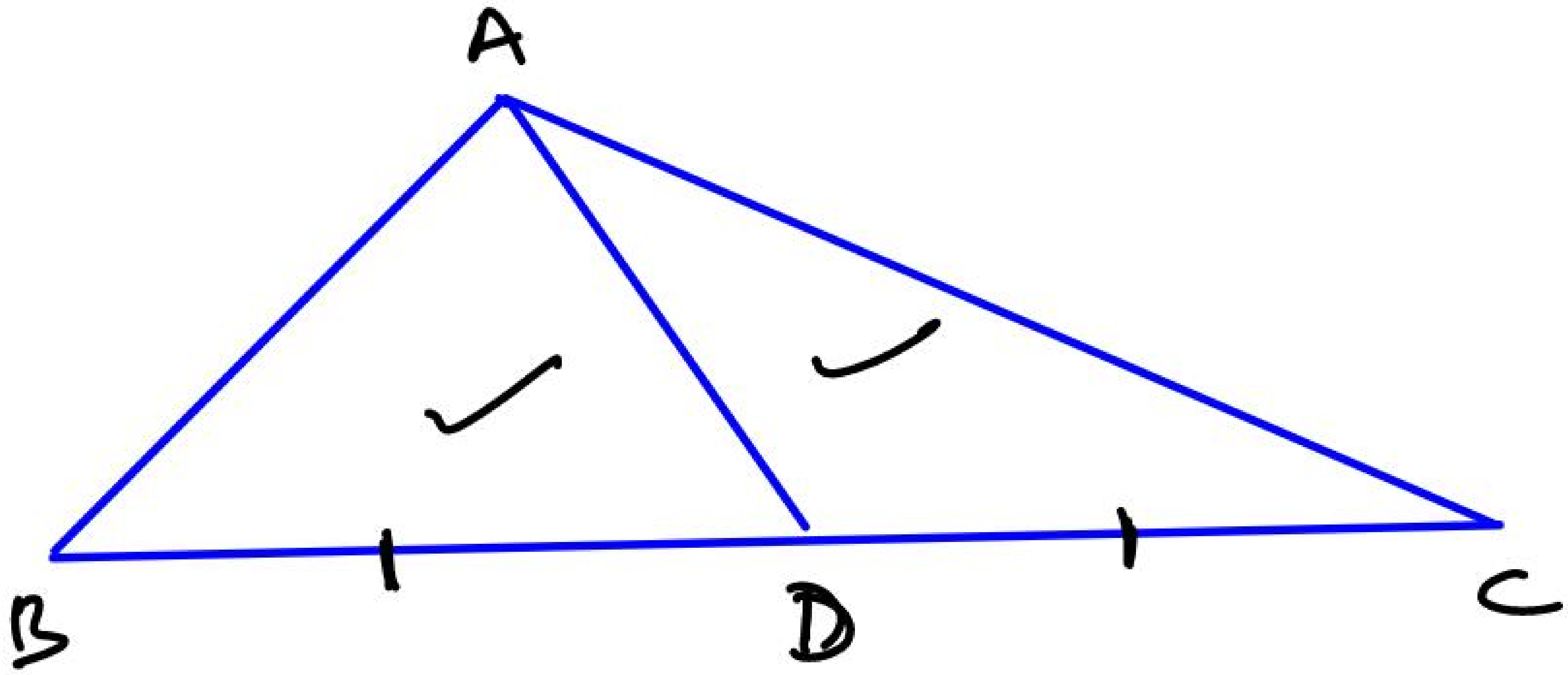
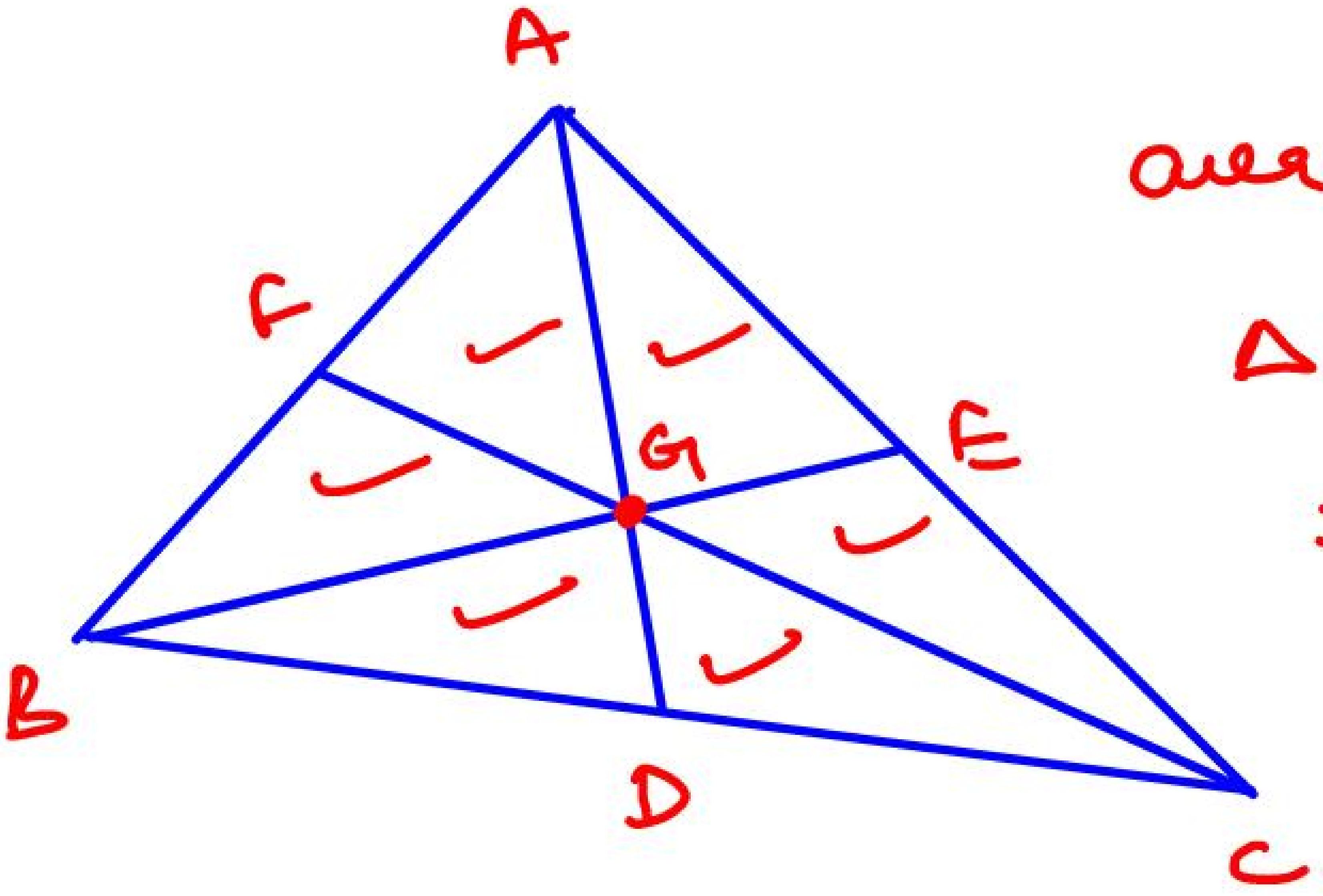
(i) Median divides a triangle in two equal areas.



area of ΔABD = area of ΔADC

(ii) Medians of a triangle divides a triangle in six equal areas.

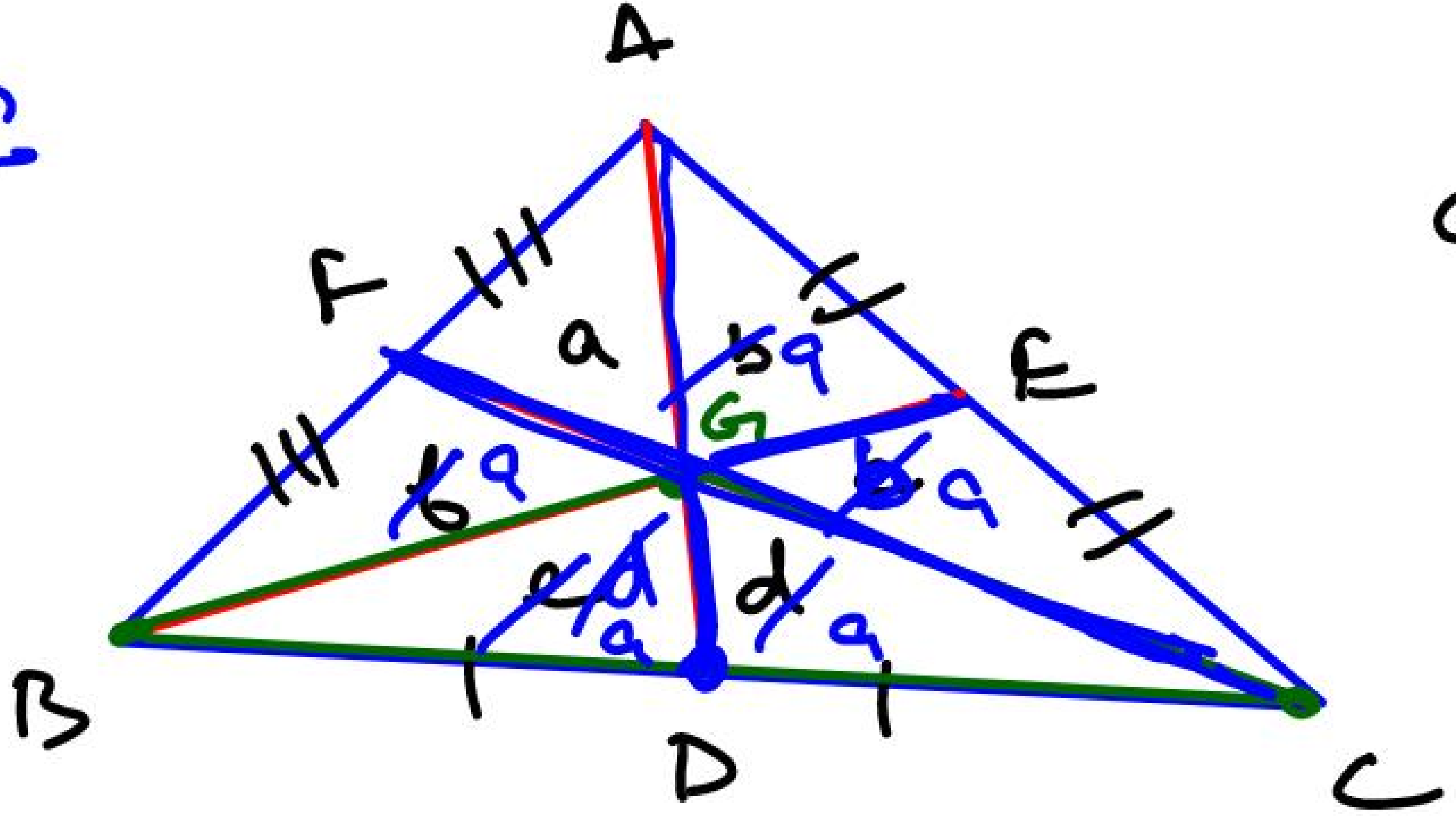


area of

$\Delta AGE = \Delta GEC = \Delta GDC$

$= \Delta GBD = \Delta GFB = \Delta AGF$

Reason



$a = b = c = d = e = f$

ΔBGC

$\underline{e = d}$

$b = c$

$a = f$

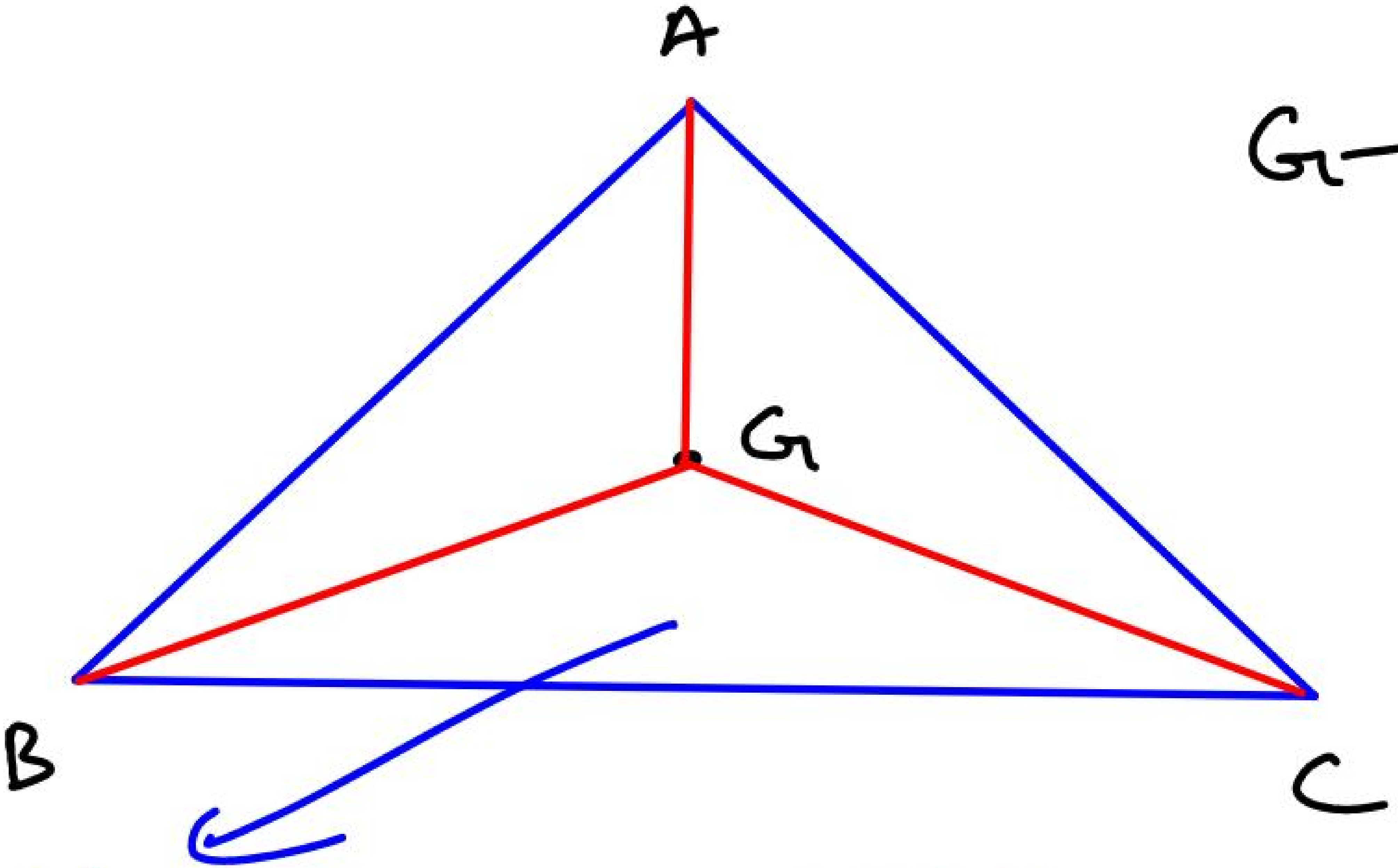
$2a + \cancel{d} = 2b + \cancel{d}$

$a = b$

$2d + a = 3a$

$d = a$

$G \to$ centroid



$1/3$

$$\frac{\text{area of } \Delta BGC}{\text{area of } \Delta ABC} = \frac{1}{3}$$

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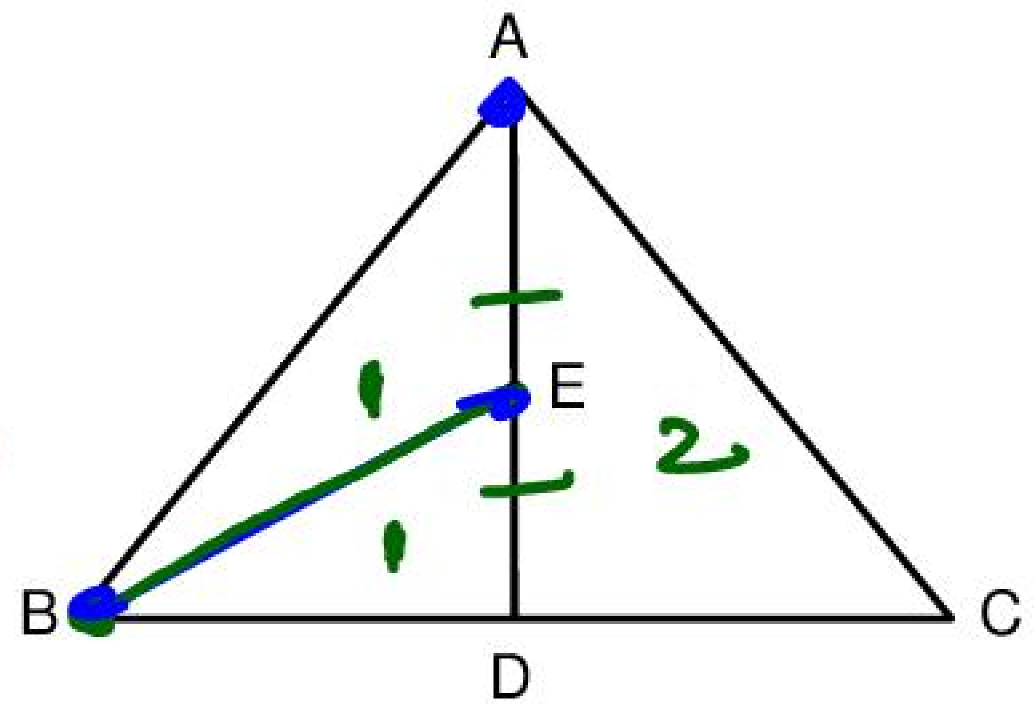
Eg1. Given : AD is the median of ΔABC.

E is the mid-point of AD.

PYQ

Find : $\dfrac{Area\ of\ \Delta ABE}{Area\ of\ \Delta ABC} \rightarrow \dfrac{1}{4}$



let area of $\Delta ABE \rightarrow$ 1 unit

ΔABD BE is median

ΔABD area of $\Delta ADC \rightarrow$ 2 units

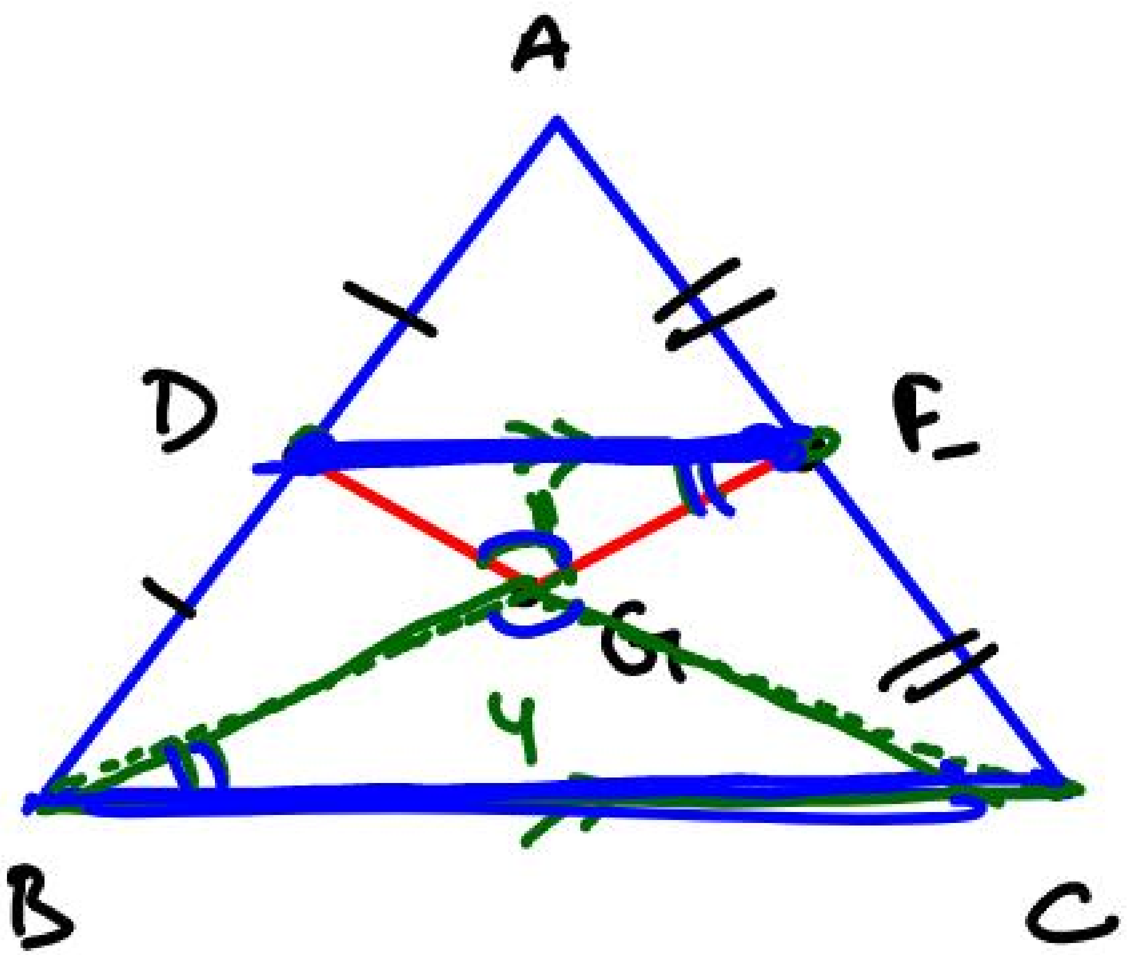
Eg2. In a ΔABC,

Imp

D, E are mid points of AB and AC and G is the centroid of ΔABC.

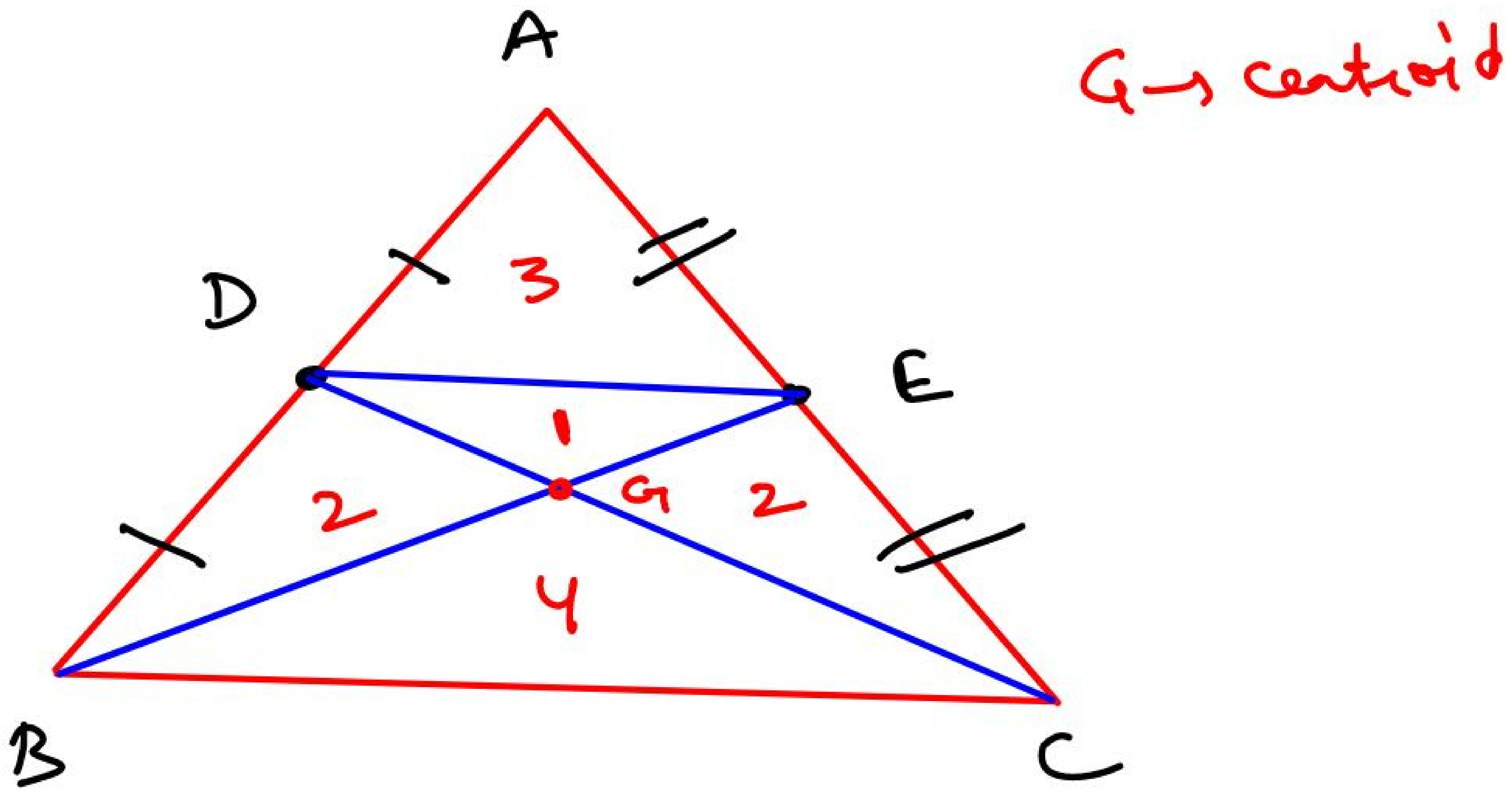
Find : $\dfrac{\textit{Area of } \Delta DEG}{\textit{Area of } \Delta ABC} = \dfrac{1}{12}$ I^{st}

$\Delta DEG \sim \Delta CBG$ (AA)



$$\boxed{\frac{\text{area } \Delta DEG}{\text{area of } \Delta CBG} = \frac{1}{4}}$$

Area of $\Delta ABC = 12$


A
D
E
B
C
G
3
1
2
2
4
G → centroid

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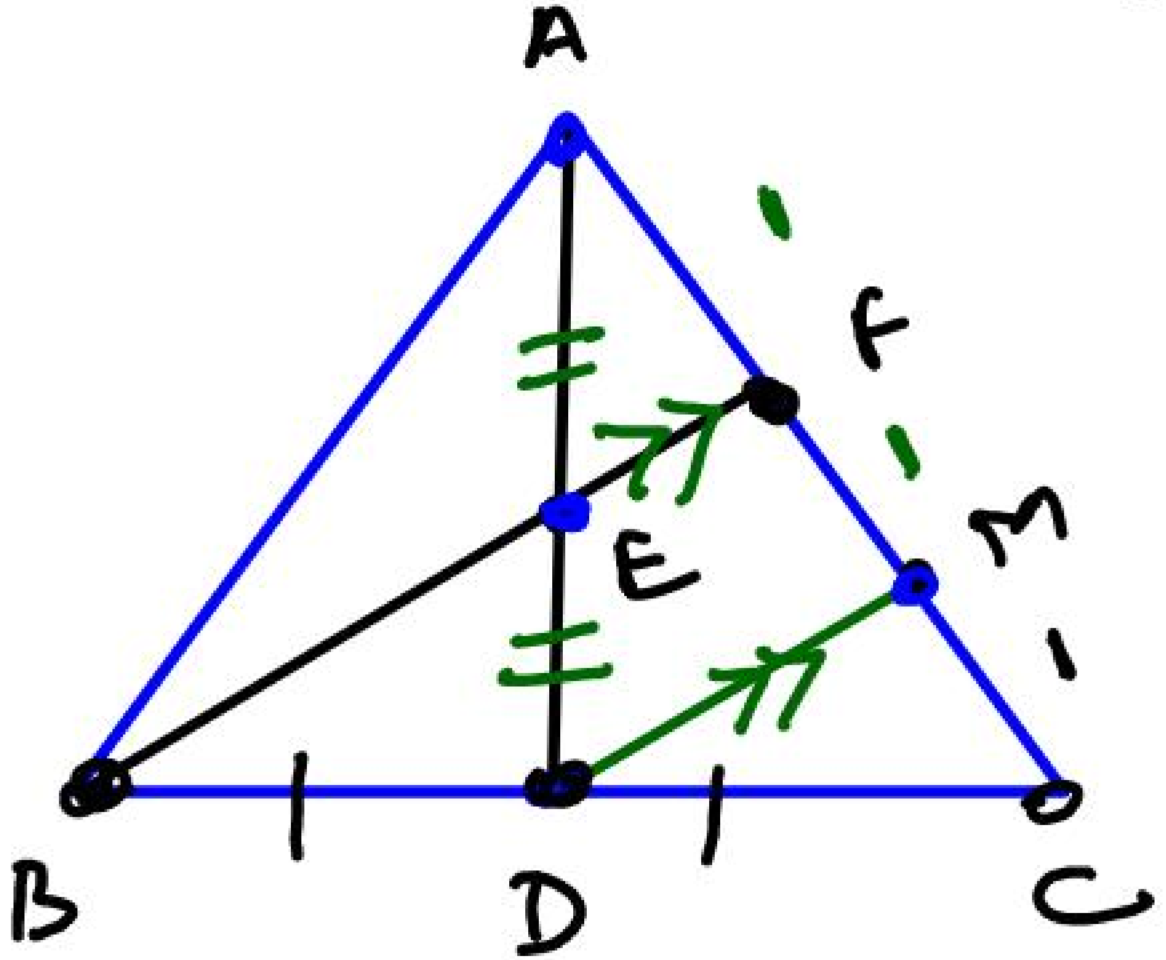
Eg3. In a ΔABC, AD is the median, E is the mid point of AD. On producing BE it meets AC at F.

v. Imp

Find : (i) AF : FC $= 1:2$

(ii) $\dfrac{\textit{Area of } \Delta AEF}{\textit{Area of } \Delta ABC} = \dfrac{1}{12}$

Const :- Draw DM || BF



(i) ΔADM EF || DM

E is m.p of AD

→ F is mid pt of AM [Converse of mid pt]

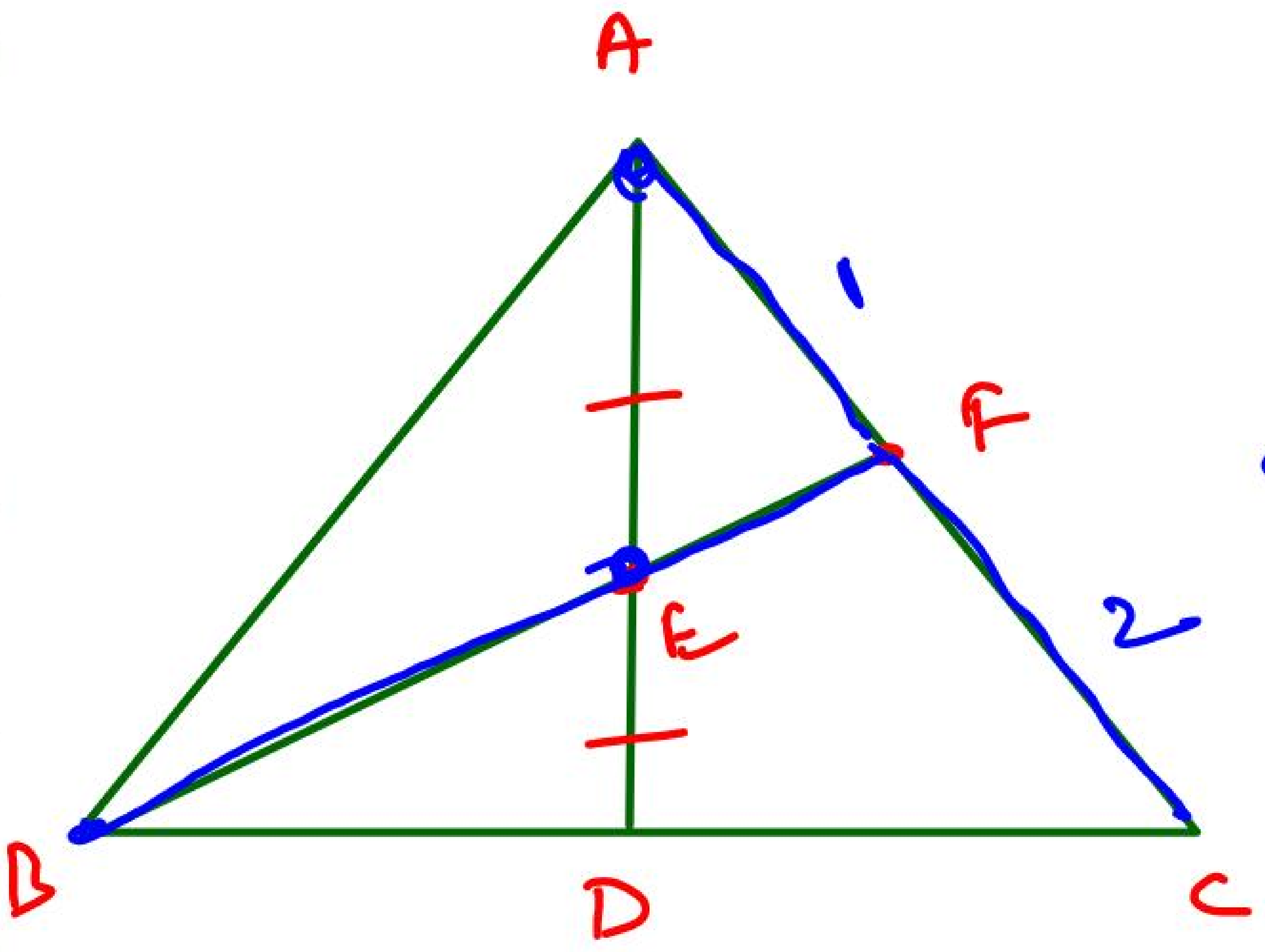
AF = FM

(ii) ΔBFC

D is m.p & DM || BF

M is mid pt of FC

FM = MC



area of $\Delta ABF = \frac{1}{3} \Delta ABC$

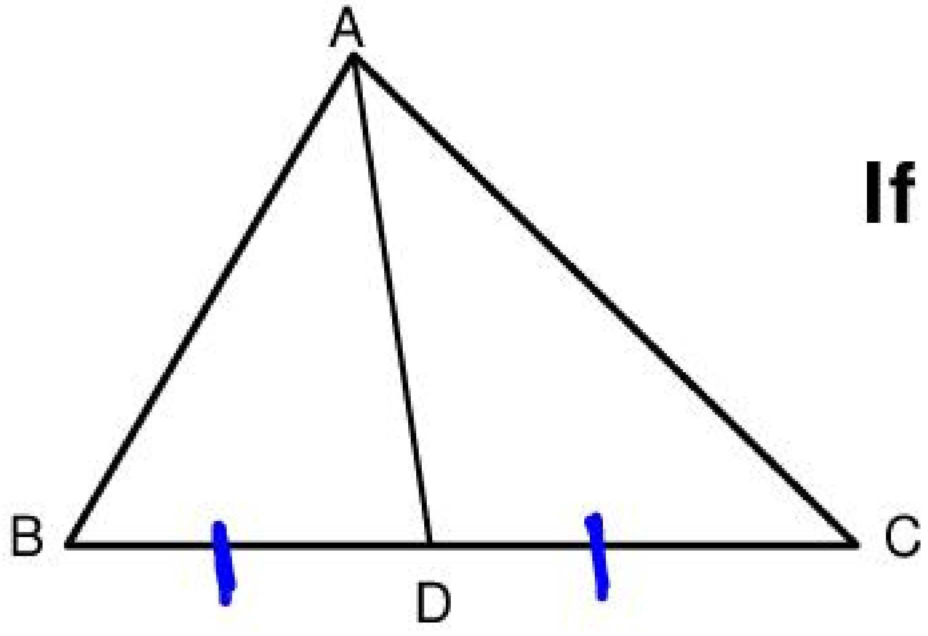
area of $\Delta ABE = \frac{1}{4} ABC$

area of ΔAEF

$= \left(\frac{1}{3} - \frac{1}{4}\right) ABC$

$= \frac{1}{12} \Delta ABC$

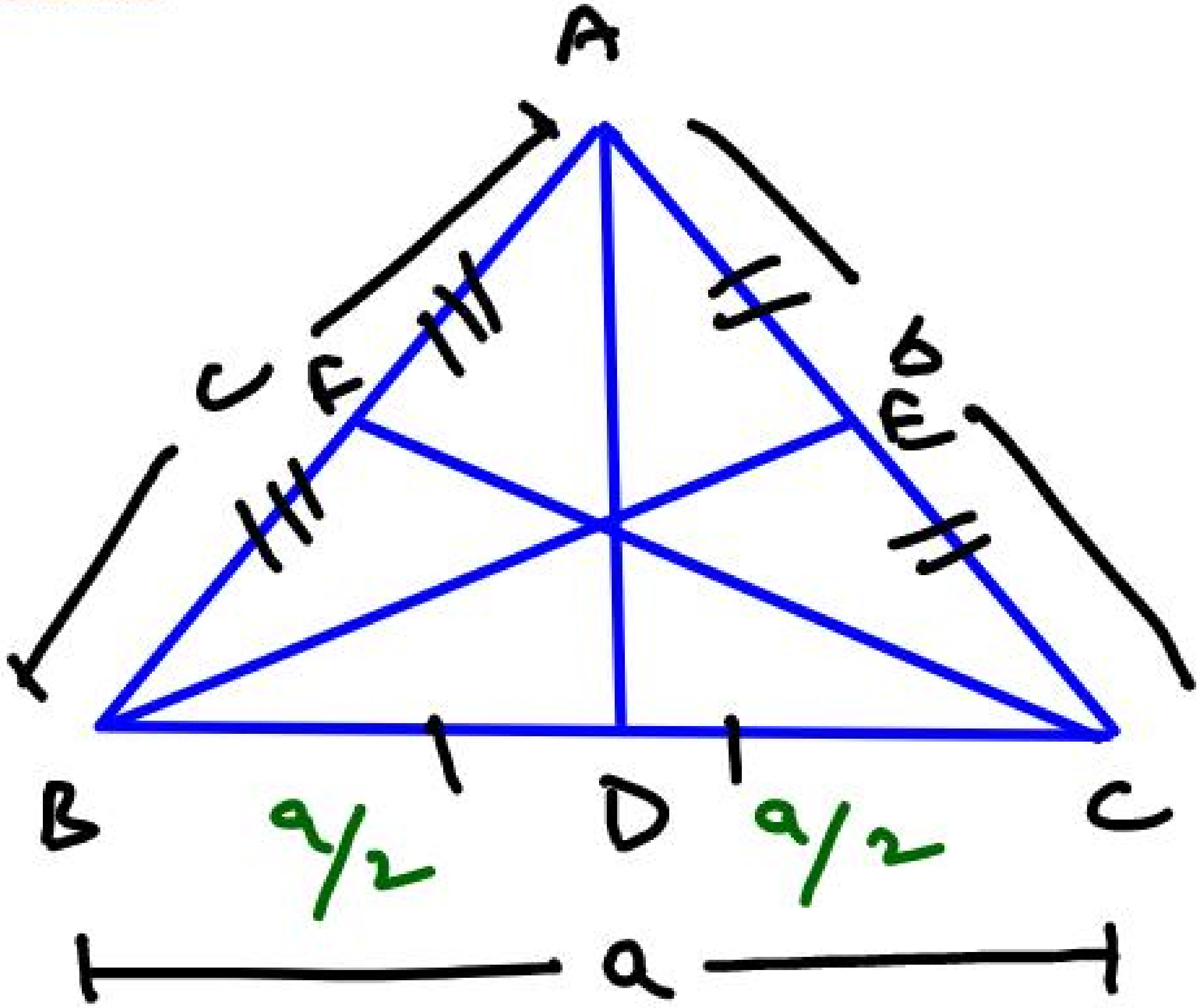
APOLLONIUS THEOREM



If AD is median of ΔABC:

$$AB^2 + AC^2 = 2\left(AD^2 + BD^2\right)$$

Use: When you have to find length of medians.



$$c^2 + b^2 = 2\left[AD^2 + \left(\frac{a}{2}\right)^2\right]$$

$$c^2 + a^2 = 2\left[(BE)^2 + \left(\frac{b}{2}\right)^2\right]$$

$$a^2 + b^2 = 2\left[(CF)^2 + \left(\frac{c}{2}\right)^2\right]$$

$$2(a^2+b^2+c^2) = 2(AD^2+BE^2+CF^2)$$

$$+\frac{a^2}{2}+\frac{b^2}{c^2}+\frac{c^2}{2}$$

$$\frac{3}{2}(a^2+b^2+c^2) = 2(AD^2+BE^2+CF^2)$$

$$3(a^2+b^2+c^2) = 4(AD^2+BE^2+CF^2)$$

$$\boxed{3(AB^2+BC^2+CA^2) = 4(AD^2+BE^2+CF^2)}$$

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imp

$$3\left(AB^2 + BC^2 + CA^2\right) = 4\left(AD^2 + BE^2 + CF^2\right)$$

AB, BC and CA are sides of Δ.

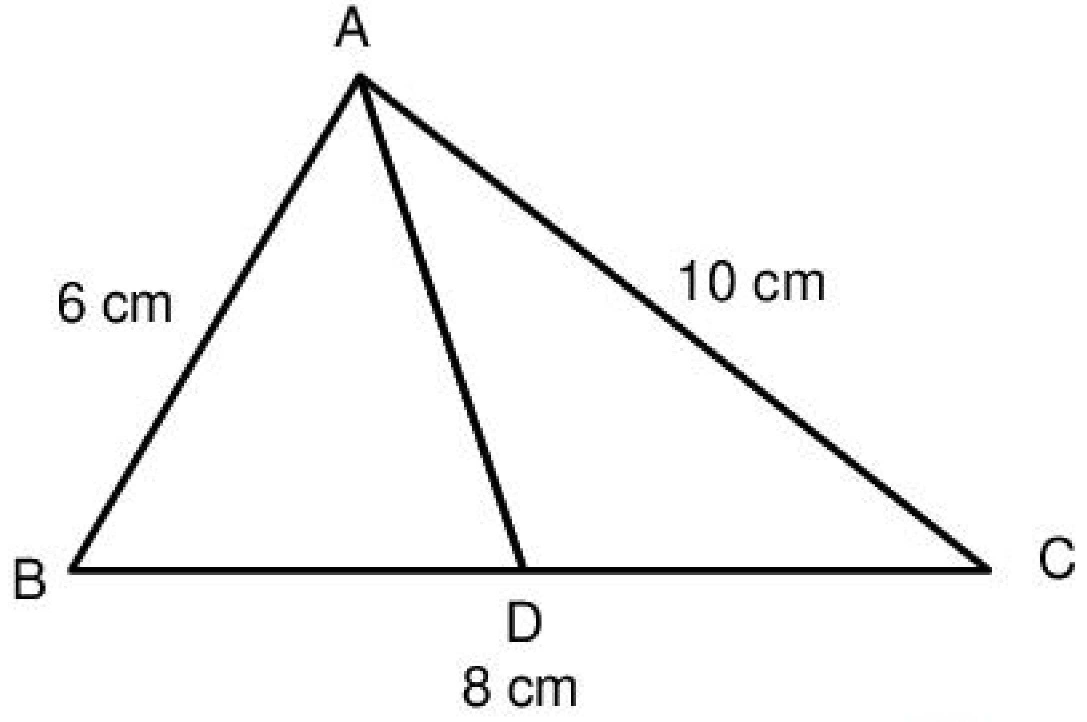
AD, BE and CF are medians of Δ.

Eg4. In the given figure, if the sides of the triangle are 6, 8 and 10 cm. Find the length of :

(i) median AD

(ii) median BE

(iii) median CF



$6^2 + 10^2 = 2(AD^2 + 4^2)$

$AD = \sqrt{52}$

$AD = 2\sqrt{13}$

$6^2 + 8^2 = 2(BE^2 + 5^2)$

$BE = 5$

$8^2 + 10^2 = 2(CF^2 + 3^2)$

$CF = \sqrt{73}$

Observations drawn from previous example.

1. Median drawn to the smallest side is largest and median drawn to the largest side is smallest.
2. Median drawn to the hypotenuse is half of the hypotenuse.

FOR ALL TRIANGLES:

If the length of the medians are M_1, M_2 & M_3

then,

$$\text{Area of } \Delta = \frac{4}{3} \times \left(\text{Area of } \Delta \text{ considering medians as sides}\right)$$

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Eg5. If the length of the mediansare 9, 12 & 15 cm, then find the area of triangle.

9, 12, 15

$$s = \frac{9+12+15}{2} = 18$$

$$\sqrt{(18)(9)(6)(3)} = \underline{\underline{54 cm^2}}$$

$$\text{Area of triangle} = \frac{4}{\cancel{3}} \times \cancel{54}^{18} \Rightarrow \underline{\underline{72 cm^2}}$$

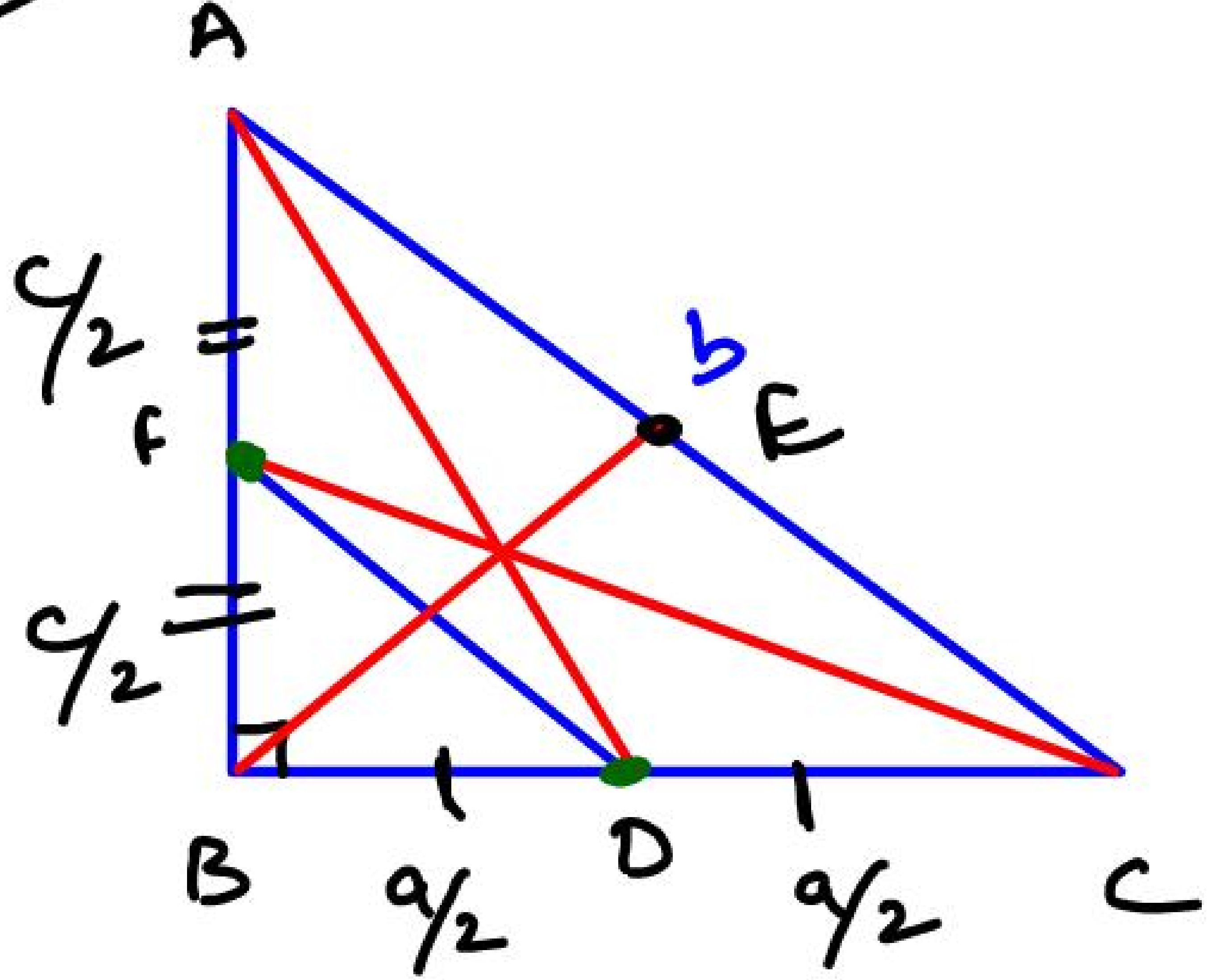
V.imp

In a right angle ΔABC, right angled at B. AD, BE and CF are medians of triangle, then:

(i) $4\,(AD^2 + CF^2) = 5\,(AC)^2$

(ii) $AD^2 + CF^2 = 5\,(DF)^2$

(ii) $AD^2 + CF^2 = 5\,(BE)^2$



ΔABD

$$AD^2 = c^2 + \frac{a^2}{4} \quad \text{—} (1)$$

ΔCBF

$$CF^2 = a^2 + \frac{c^2}{4} \quad \text{—} (2)$$

$$AD^2 + CF^2 = \frac{5}{4}(a^2 + c^2)$$

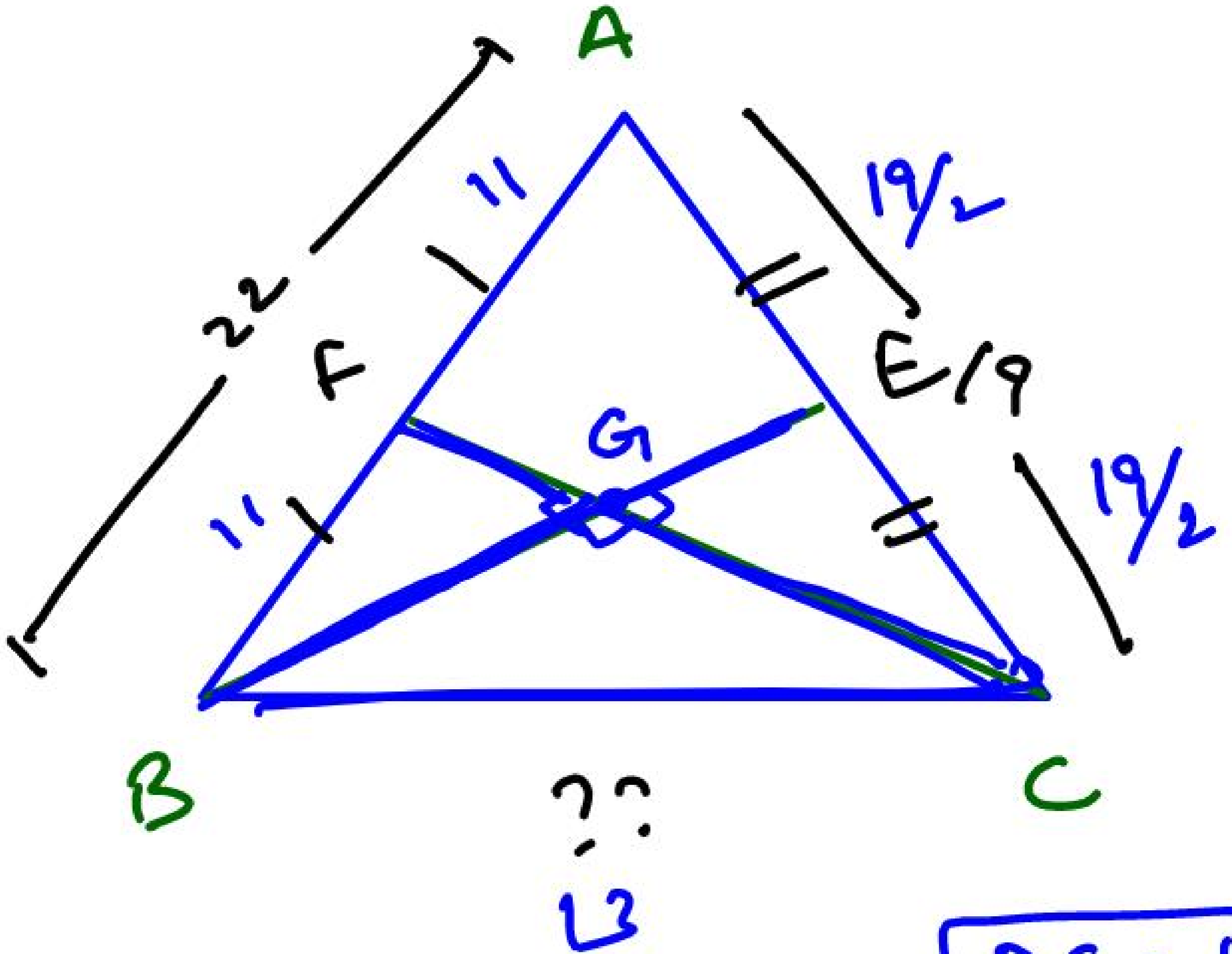
$$AD^2 + CF^2 = \frac{5}{4} AC^2$$

$$4(AD^2 + CF^2) = 5AC^2$$

$$4(AD^2 + CF^2) = 5(AC^2)$$

$$\cancel{4}(AD^2 + CF^2) = 5(\cancel{4}DF^2)$$

Eg6. In a ΔABC, medians BE and CF are $\perp$ to each other, if AB = 22 cm and AC = 19 cm. Find the length of BC.



$$BG^2 + \cancel{GF^2}^{\,\frac{CG^2}{4}} = 11^2 \quad \text{—(1)}$$

$$CG^2 + \cancel{GE^2}_{\,\frac{BG^2}{4}} = \left(\frac{19}{2}\right)^2 \quad \text{—(2)}$$

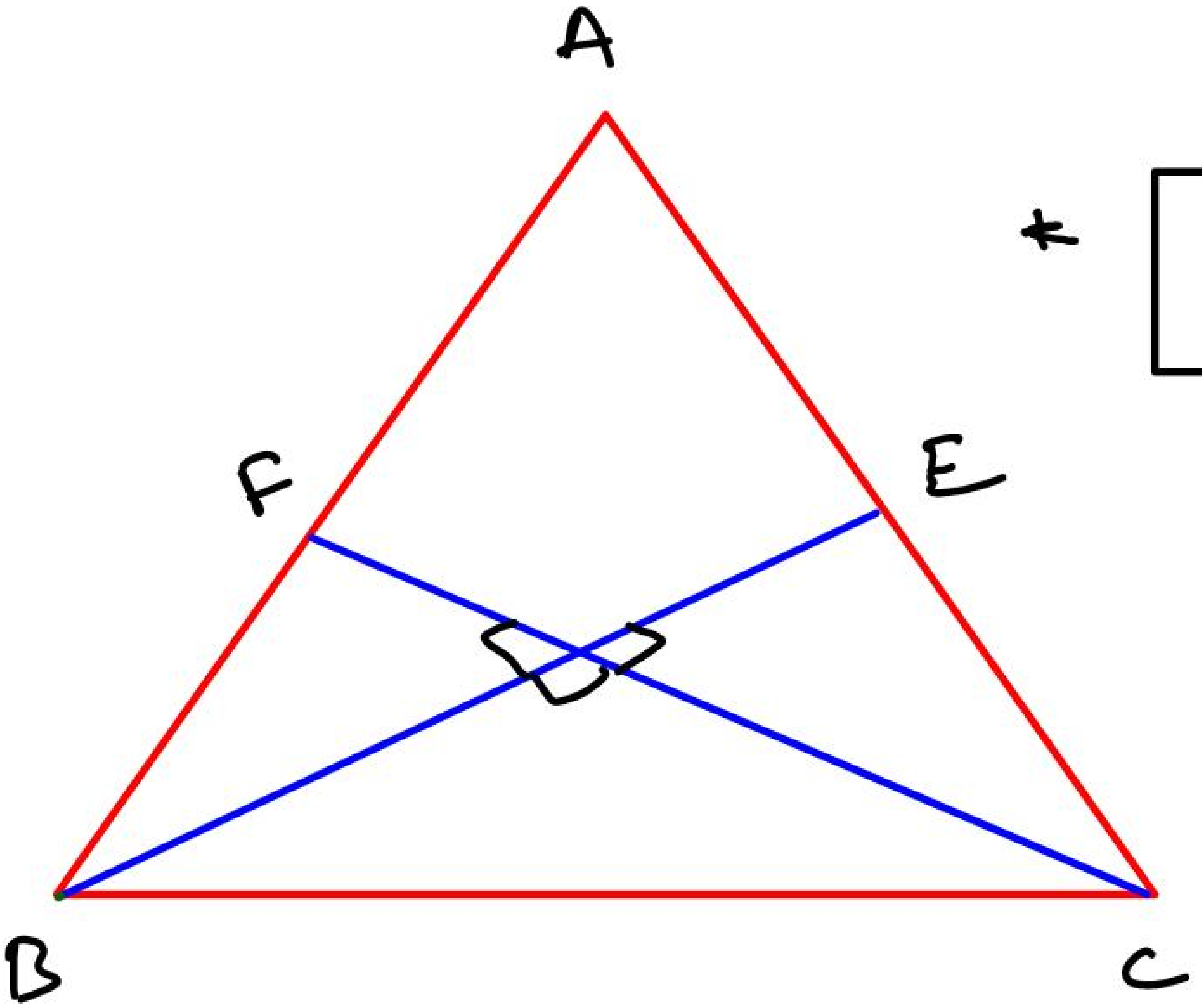
$$\frac{5}{4}\left[BG^2 + CG^2\right] = 121 + \frac{361}{4}$$

$$5\left[BG^2 + CG^2\right] = 484 + 361$$

$$BG^2 + CG^2 = 169$$

$$BC^2 = 169$$

$$\boxed{BC = 13}$$



* $\boxed{AB^2 + AC^2 = 5(BC)^2}$

$22^2 + 19^2 = 5(BC)^2$

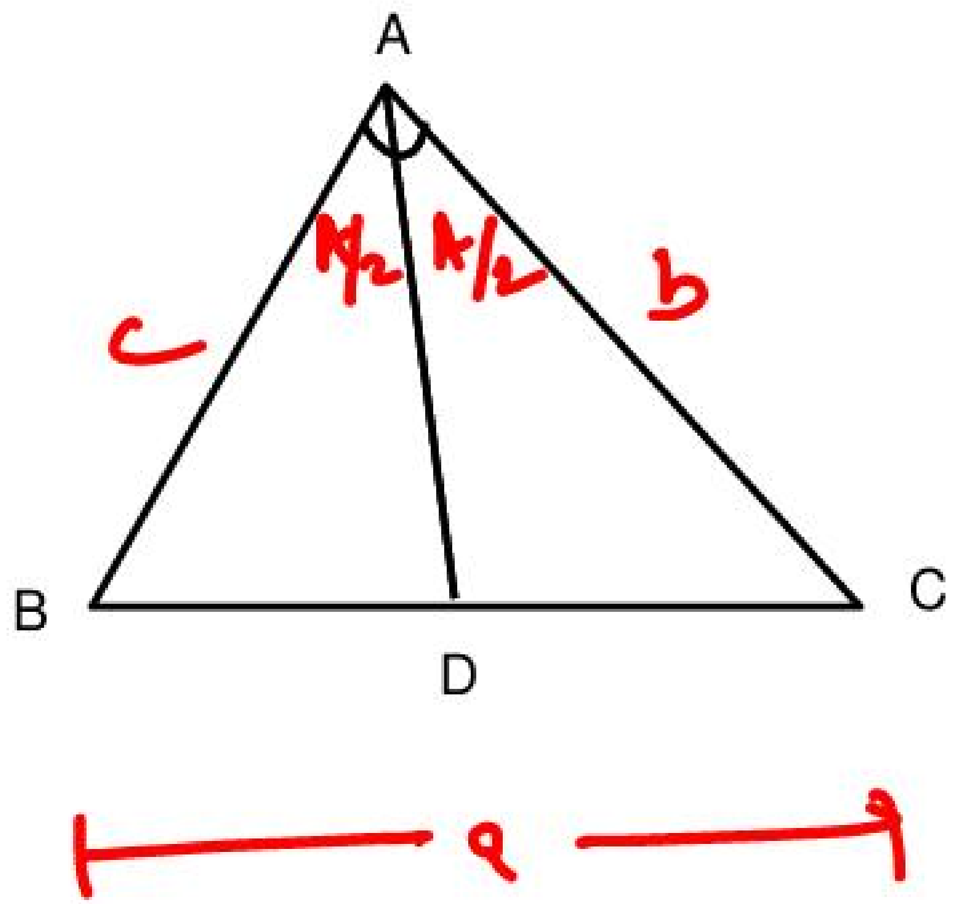
$BC^2 = 169$

$BC = 13$ cm

$$\frac{3}{4}(Perimeter) < (AD + BE + CF) < Perimeter$$

Where, AD, BE and CF are medians of the triangle.

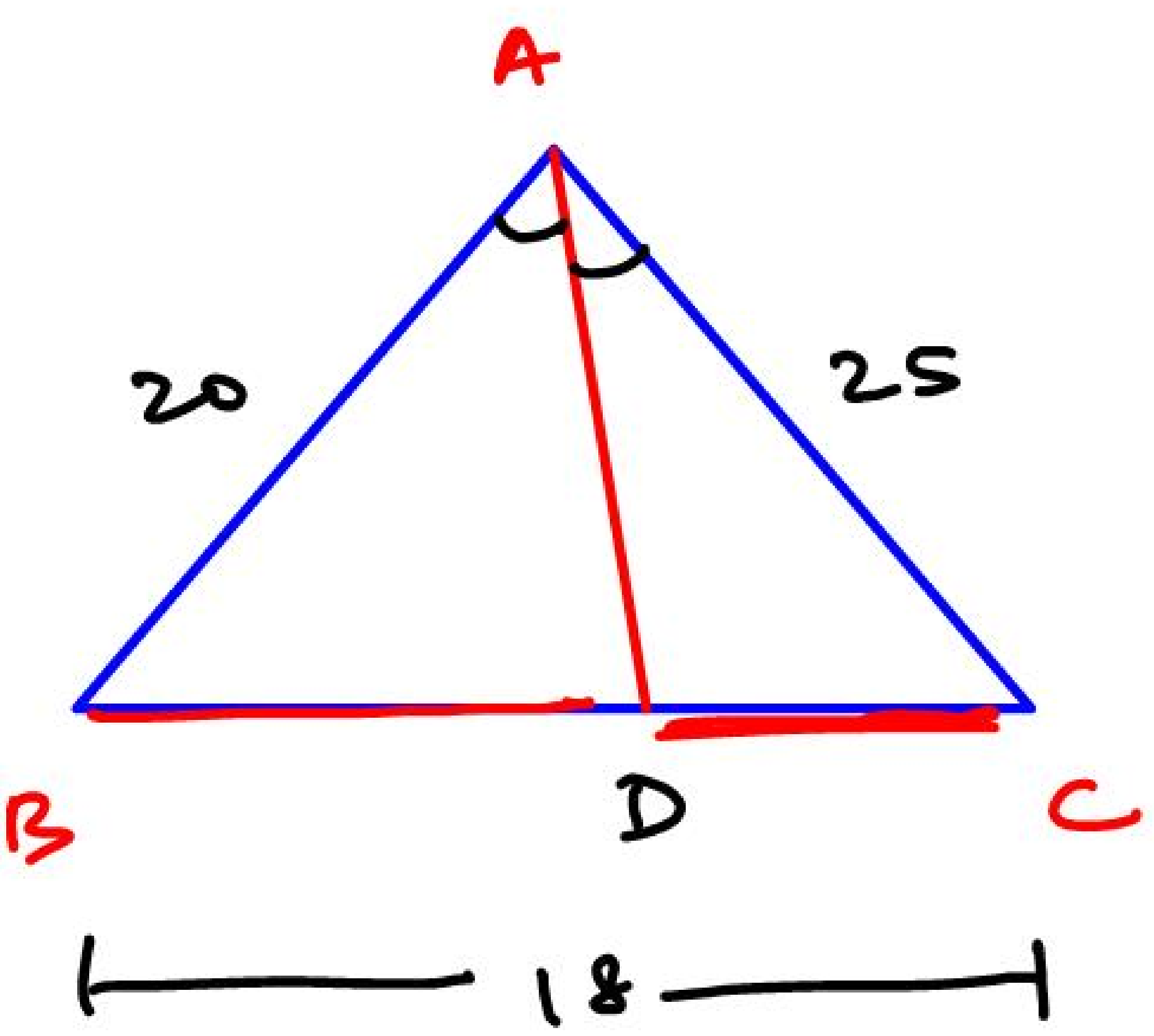
INTERNAL ANGLE BISECTOR THEOREM



Given AD is angle bisector of ∠BAC.

$$\frac{AB}{AC} = \frac{BD}{DC}$$

Eg7. In a ΔABC, AD is the angle bisector of $\angle BAC$, where D is point on BC. If AB = 20 cm, AC = 25 cm, BC = 18 cm, find the length of DC.

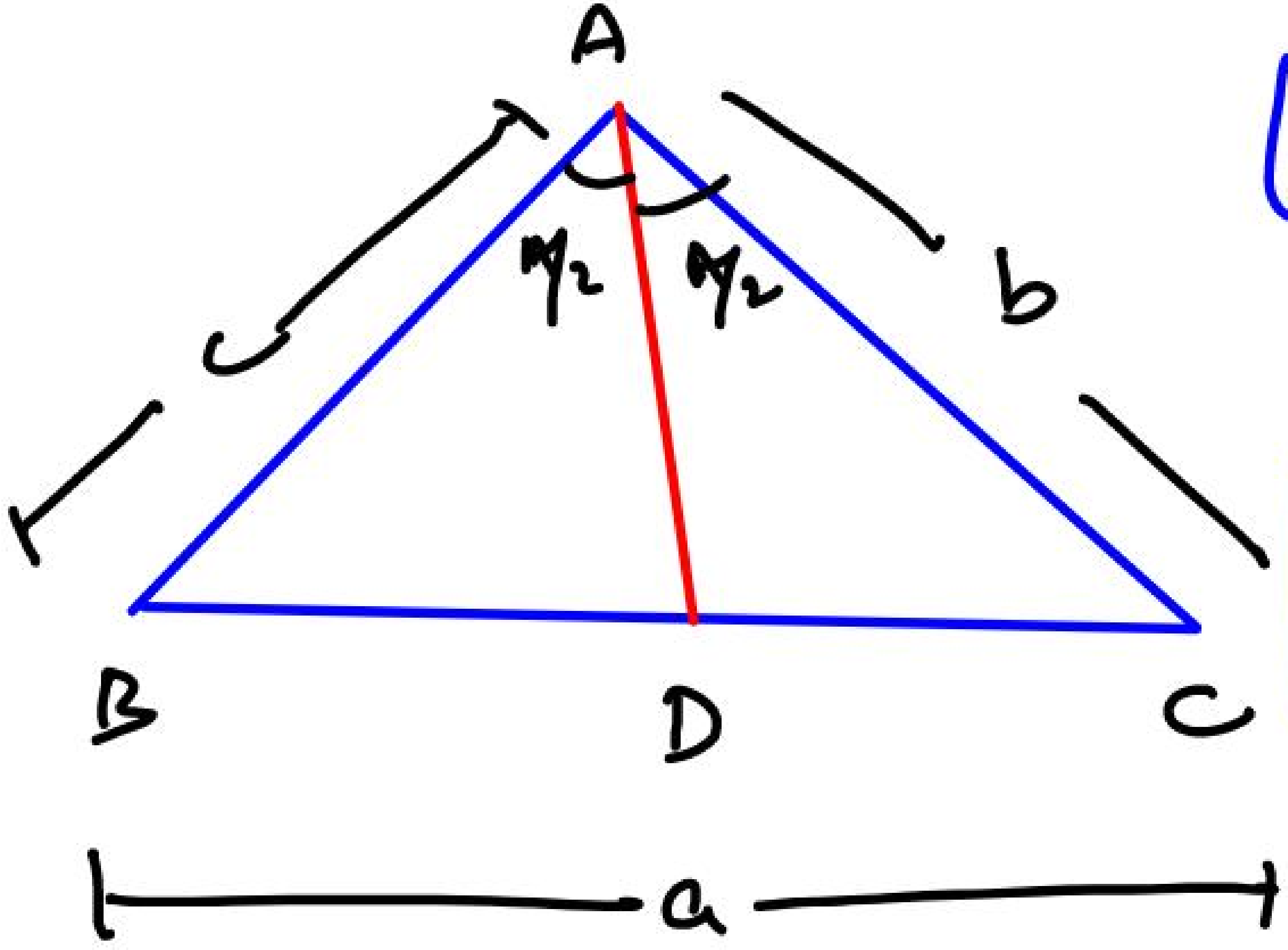


$$\frac{AB}{AC} = \frac{\cancel{20}\ 4}{\cancel{25}\ 5}$$

9 units $\rightarrow$ 18

DC = 10 cm

LENGTH OF ANGLE BISECTOR



$$\text{area of } \Delta ABC = \frac{1}{2} b \cdot c \sin A$$

$$\text{area of } \Delta ABD = \frac{1}{2} c \cdot AD \sin A/2$$

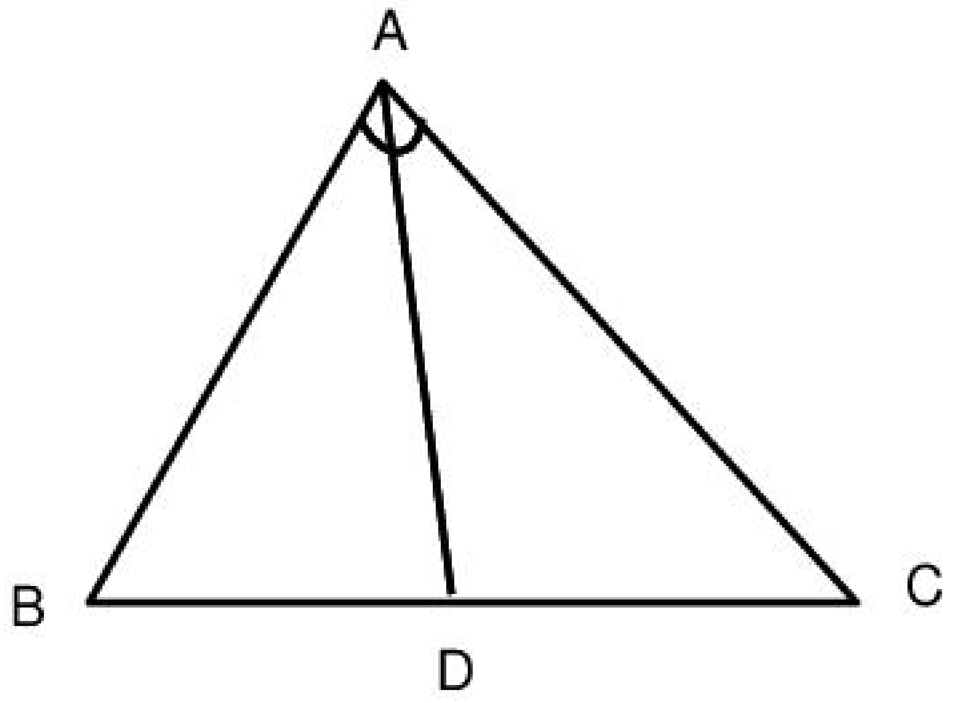
$$\text{area of } \Delta ADC = \frac{1}{2} b\, AD \sin A/2$$

$$\cancel{\frac{1}{2}} bc \sin A = \cancel{\frac{1}{2}} AD \sin A/2\,(c+b)$$

$$bc \cdot 2 \cancel{\sin A/2} \cos A/2 = AD \cancel{\sin A/2}\,(c+b)$$

$$\boxed{AD = \frac{2bc}{b+c} \cos A/2}$$

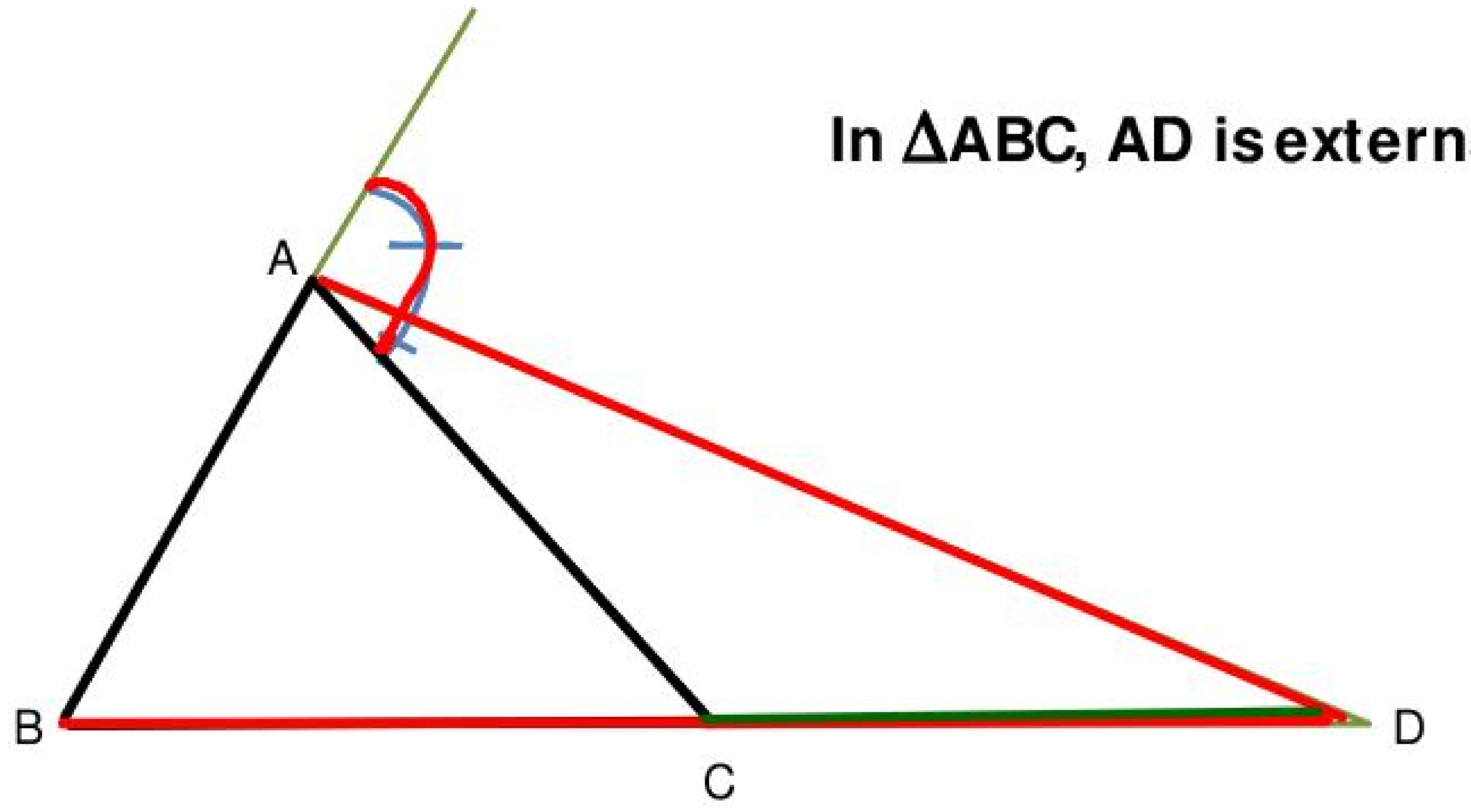
CONVERSE OF ANGLE BISECTOR THEOREM



If $$\frac{AB}{AC} = \frac{BD}{DC}$$

Then AD $\rightarrow$ Angle bisector of $\angle$BAC.

EXTERNAL ANGLE BISECTOR THEOREM



In ΔABC, AD is external angle bisector.

$$\boxed{\frac{AB}{AC} = \frac{BD}{CD}}$$

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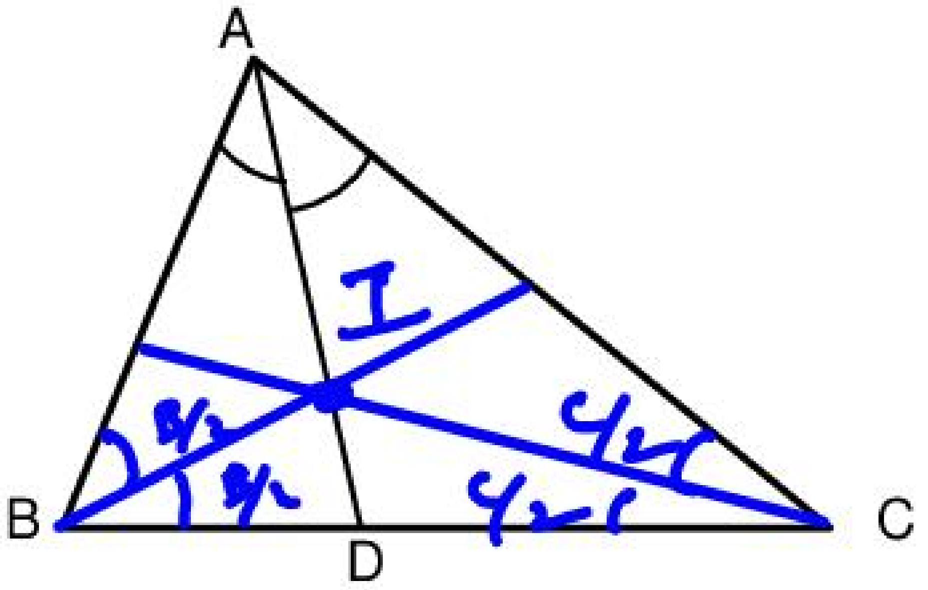
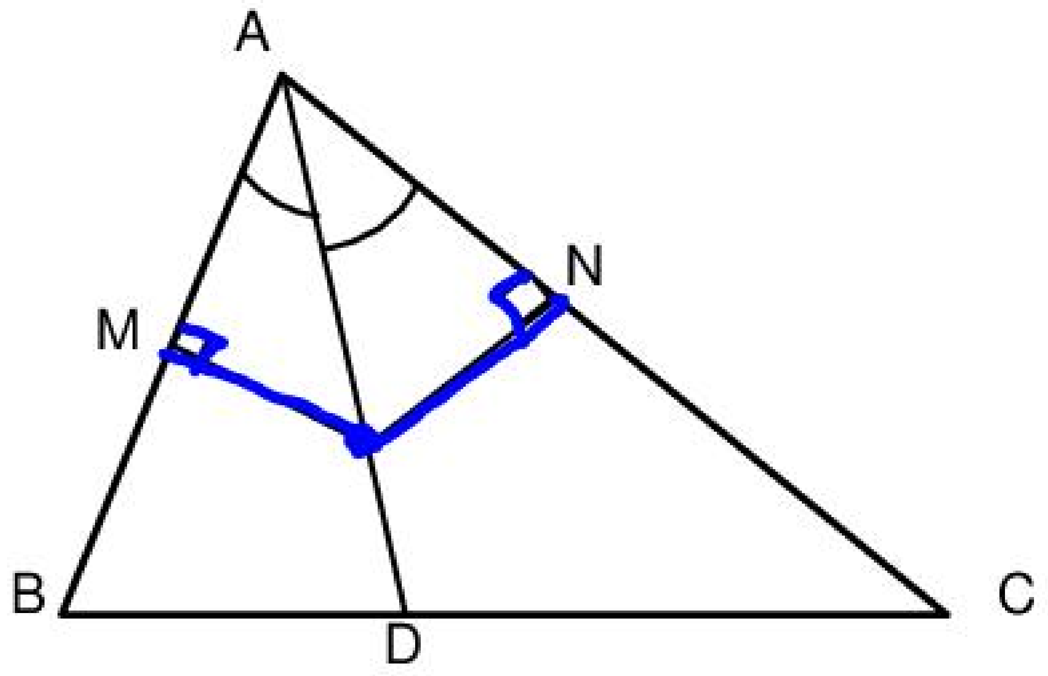
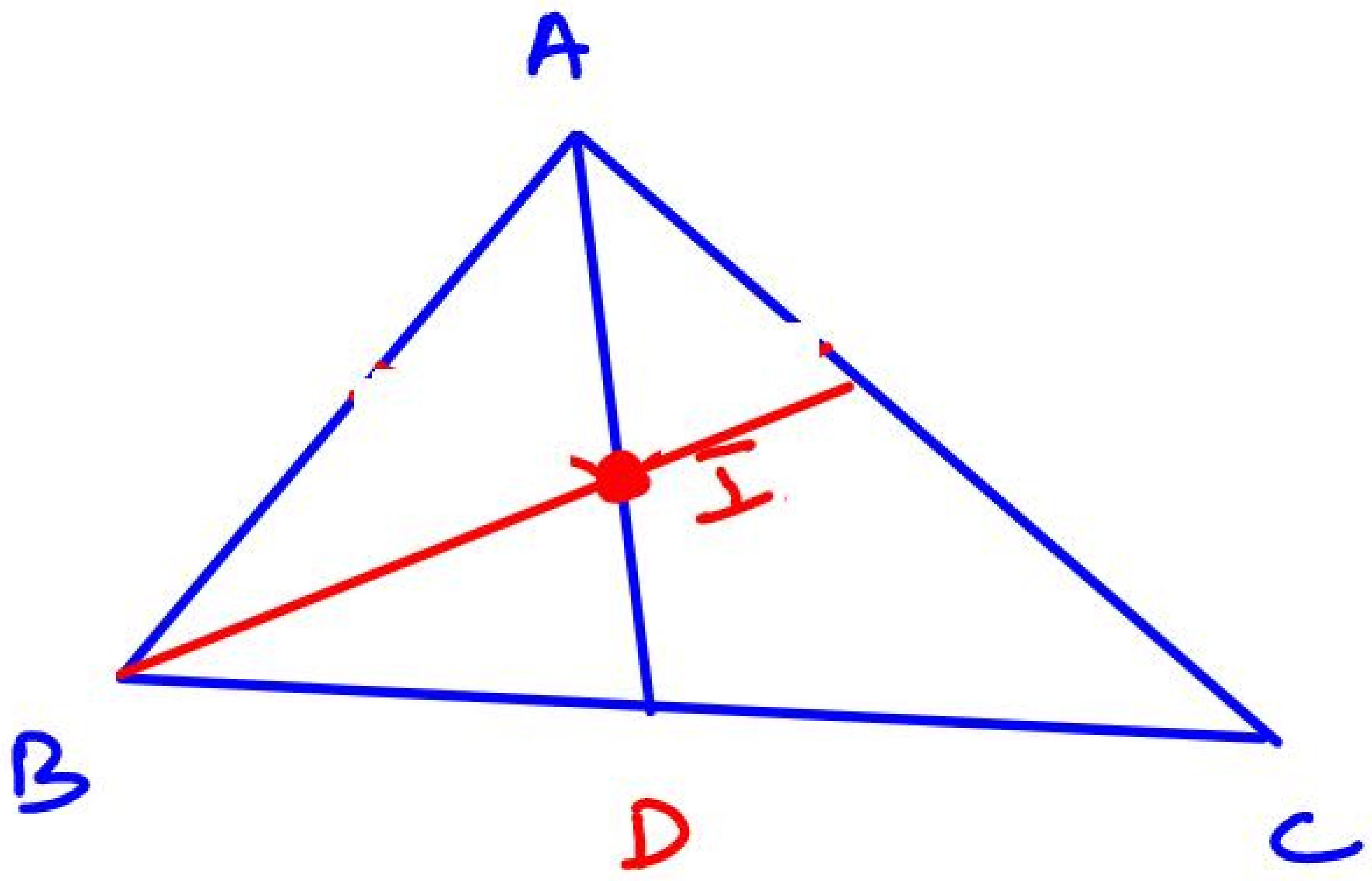
INCENTRE

Def: Meeting point of Angle Bisector.



If you take any point on the angle bisector of $\angle A$, then that point is equidistant from the sides AB and AC.





I is equidistant from AB & AC

I is eq from AB & BC

I is eq from all sides of Δ

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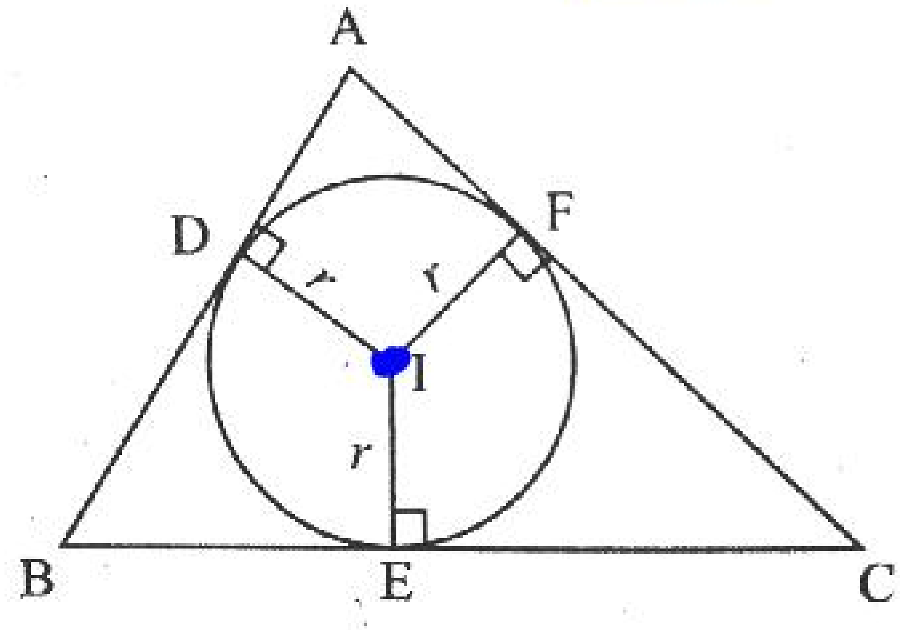
Incentre is the centre of the circle inscribed in a triangle and it is equidistant from the sides of the triangle.

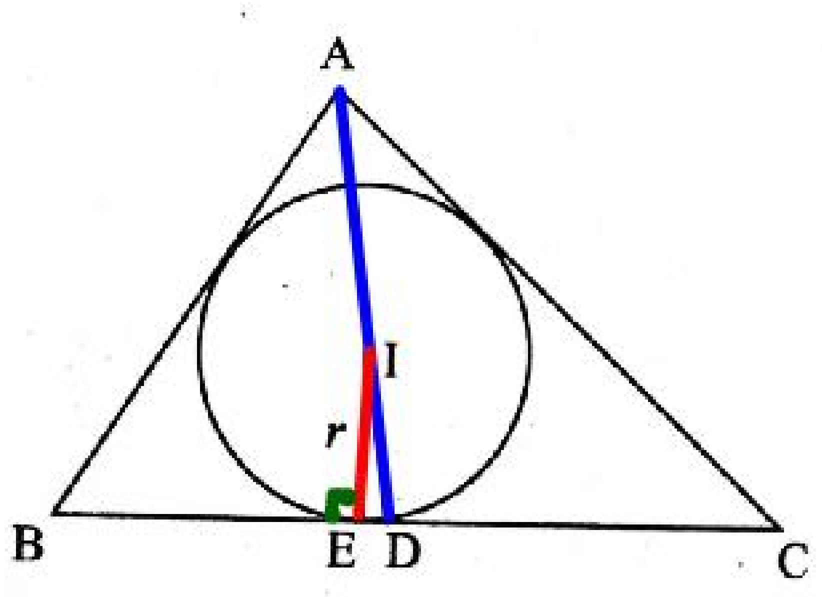


General $r = \frac{\text{Area}}{s}$

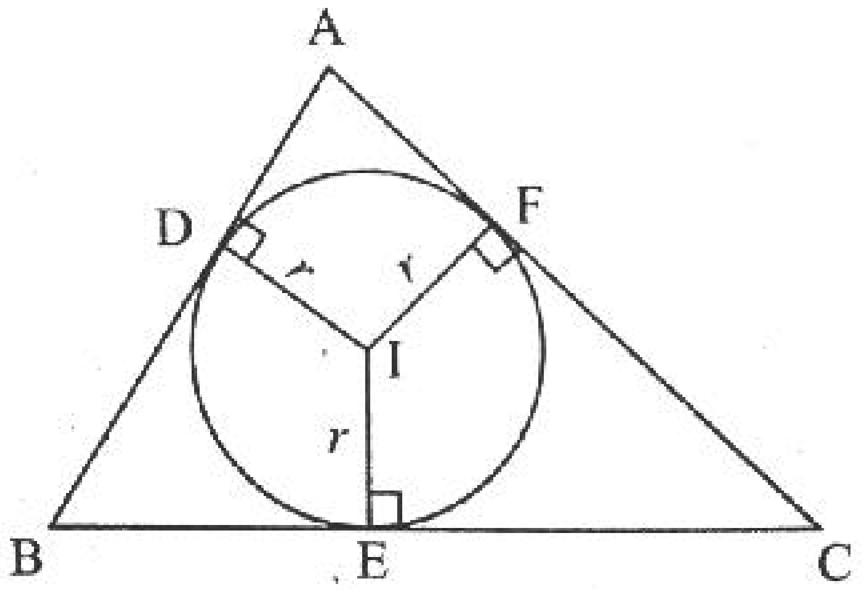
Equilateral $r = \frac{\text{side}}{2\sqrt{3}}$

Right Angle $r = \frac{b+p-h}{2}$

The bisector of ∠A of ΔABC may or may not intersect side BC at point E where the incircle touches the side BC of the triangle and the same is true for other angle bisectors.



Area of $\Delta = r \cdot s$



Where, r is the inradius of ΔABC and

s is semi-perimeter

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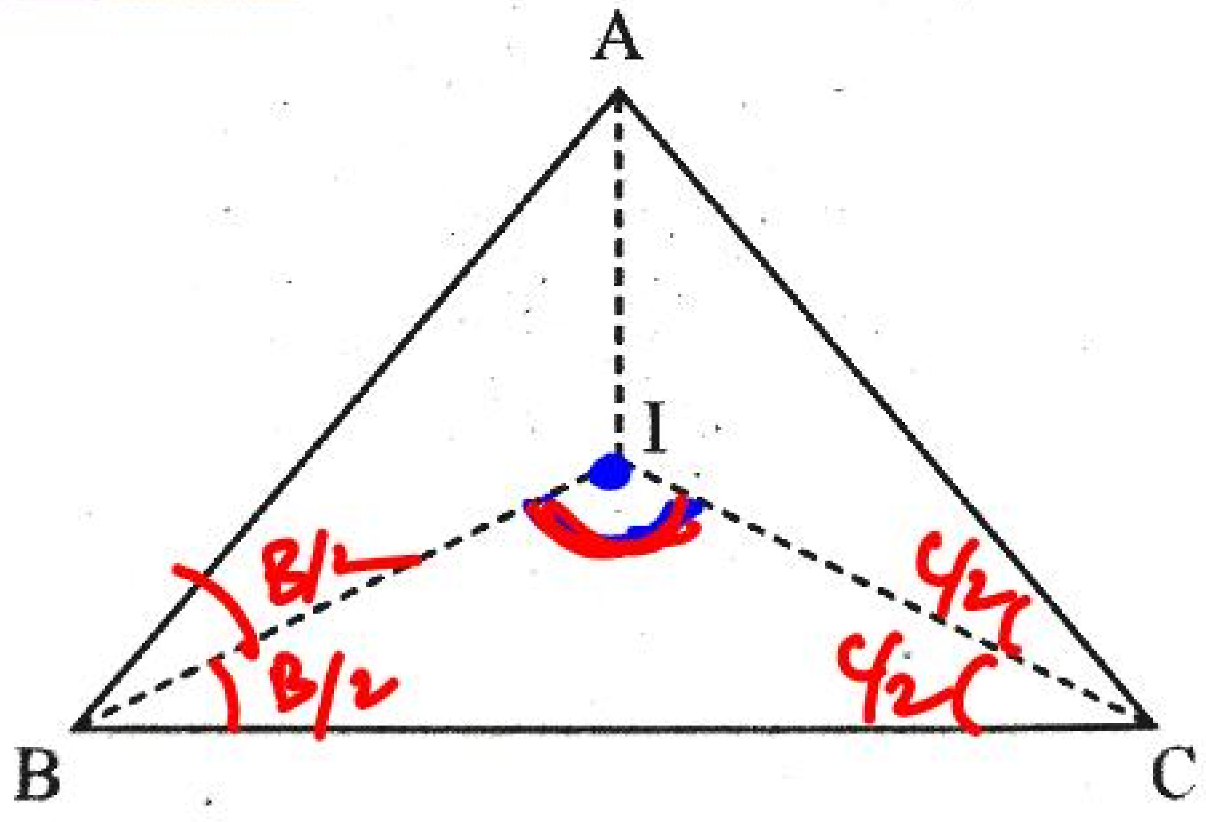


If I is the incentre of ΔABC,

$$\boxed{\angle BIC = 90 + \frac{\angle A}{2}}$$

Reason

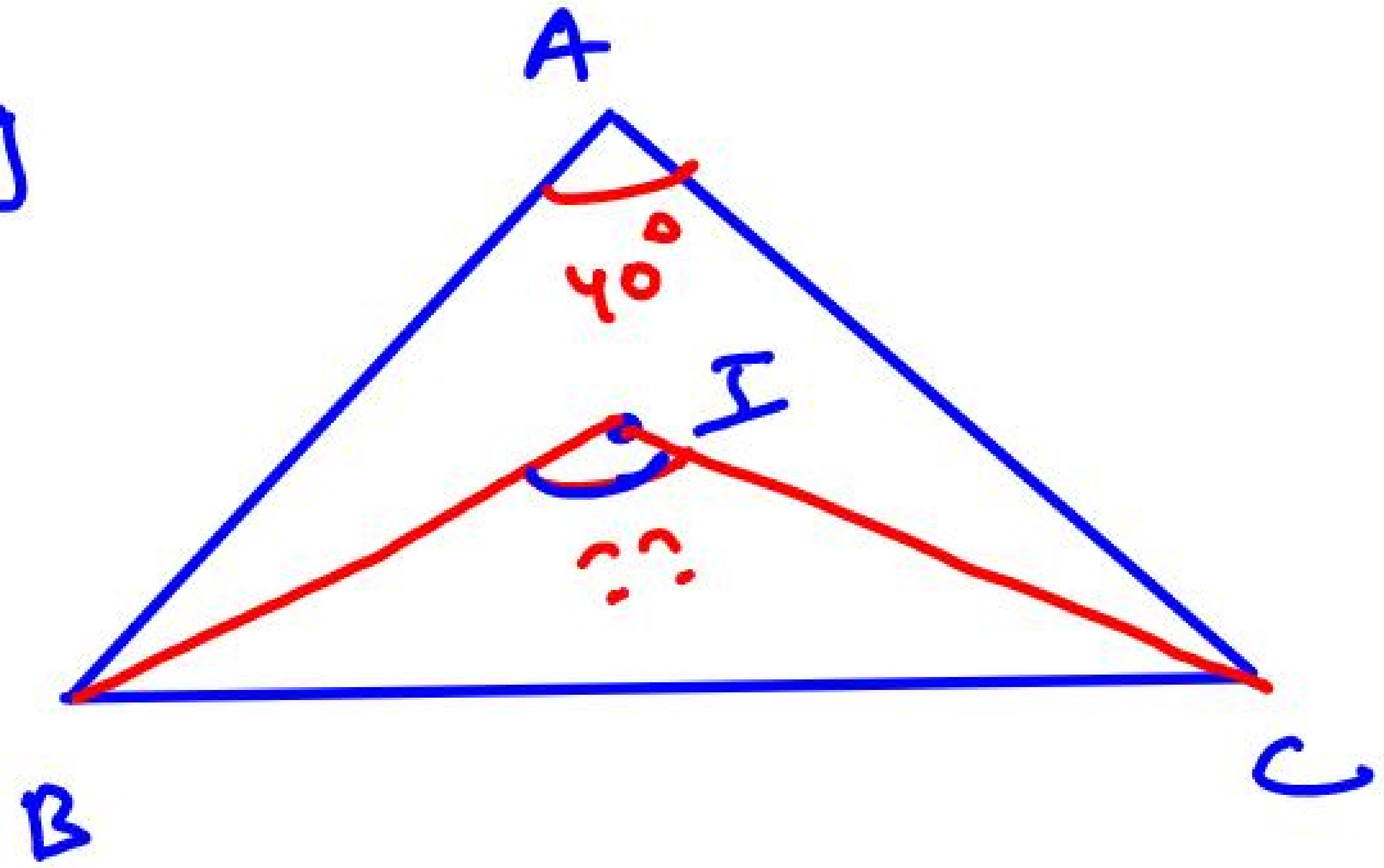
In ΔBIC

$\frac{B}{2} + \frac{C}{2} + \angle BIC = 180$

$\frac{B}{2} + \frac{C}{2} + \angle BIC = 90 + 90$

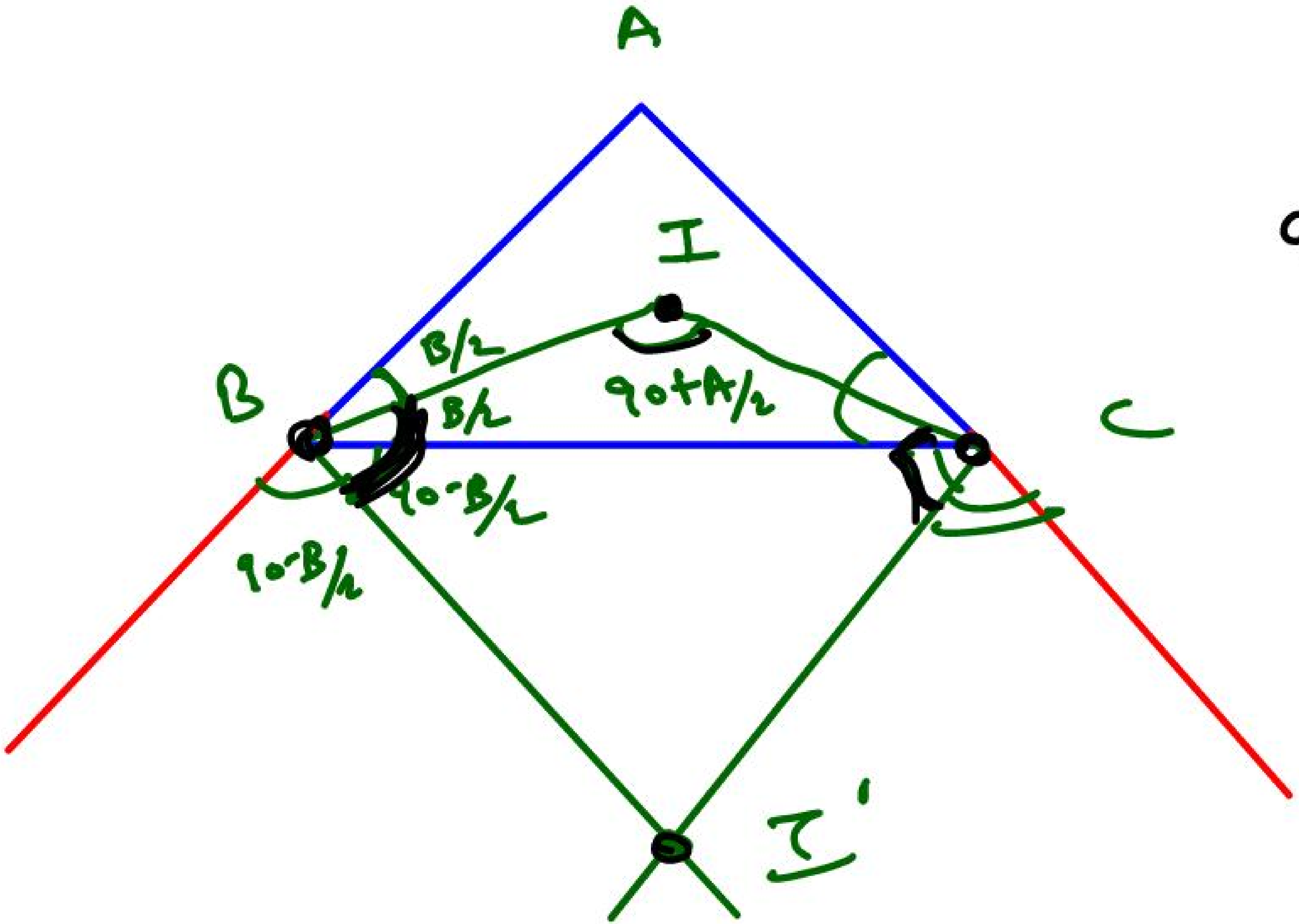
$\cancel{\frac{B}{2}} + \cancel{\frac{C}{2}} + \angle BIC = \frac{A}{2} + \cancel{\frac{B}{2}} + \cancel{\frac{C}{2}} + 90$

eg



$\angle BIC \Rightarrow 90 + 20$

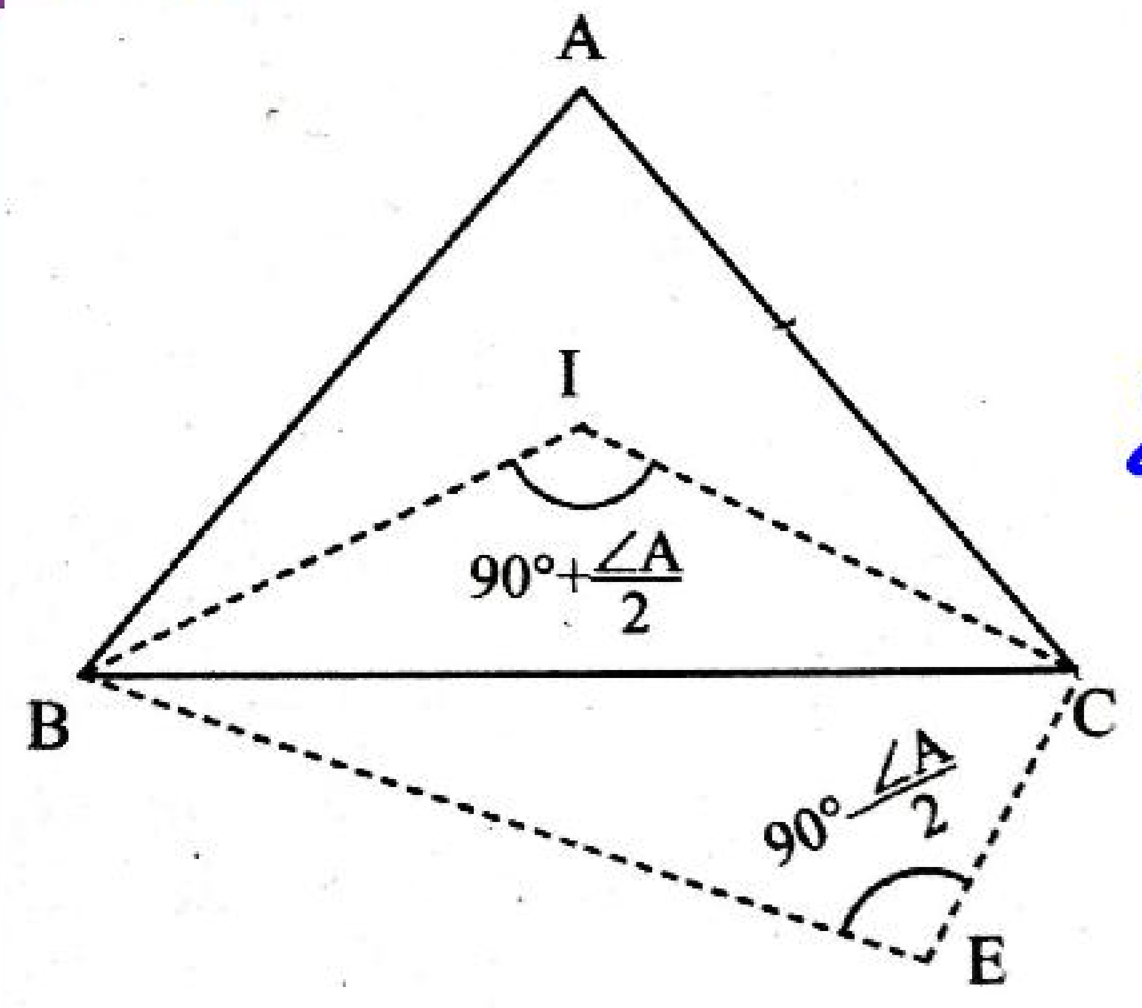
$\Rightarrow \underline{\underline{110}}$



$90 + 90 + \frac{A}{2} + 90 +$

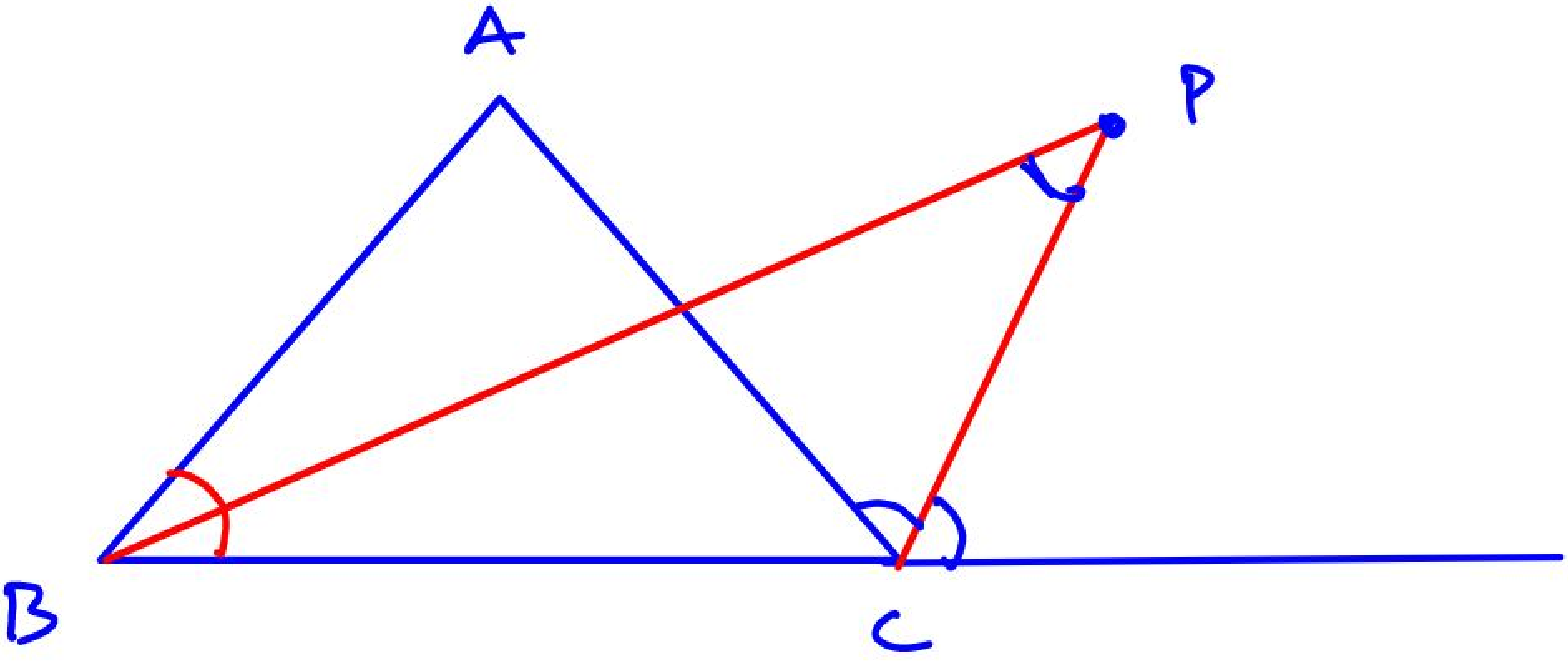
$\angle BI'C = 360$

$\angle BI'C = 90 - A/2$



The external angle bisectors of ∠B and ∠C meet at point E.

$$\boxed{\angle BEC = 90 - \frac{\angle A}{2}}$$



$$\boxed{\angle BPC = \frac{1}{2}\angle A}$$

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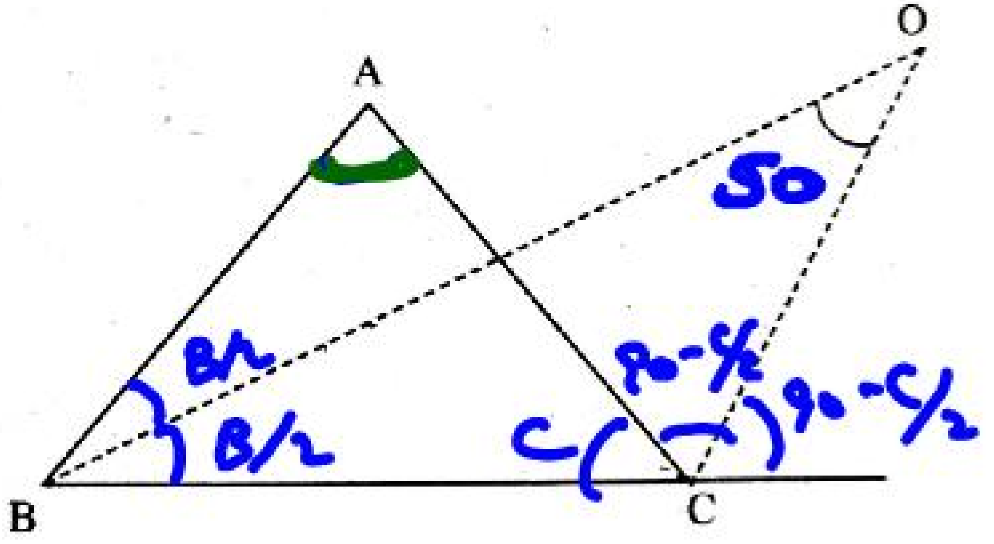
Eg8. The bisectors of the internal angle ∠B and external angle ∠C of a triangle ABC intersect at O. If ∠BOC = 50, then ∠A is :

(a) 100 (b) 60

(c) 120 (d) 90



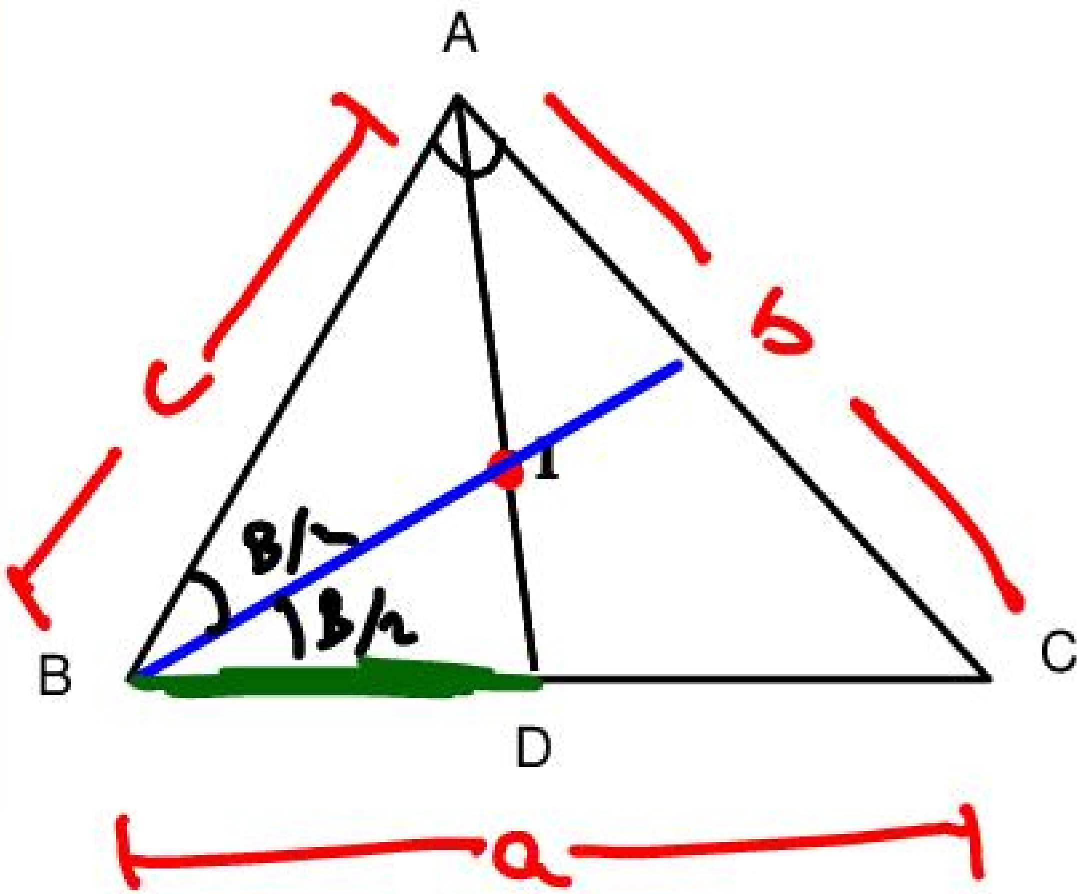
ΔBOC

$\frac{B}{2} + 50 + 90 - \frac{C}{2} + C = 180$

$\frac{B}{2} + \frac{C}{2} = 40$

$\boxed{B + C = 80}$

$\angle A = 100$



In a ΔABC, $\mathbf{I}$ is the incentre

$$\frac{AI}{ID} = \frac{b+c}{a}$$

Reason

ΔABD

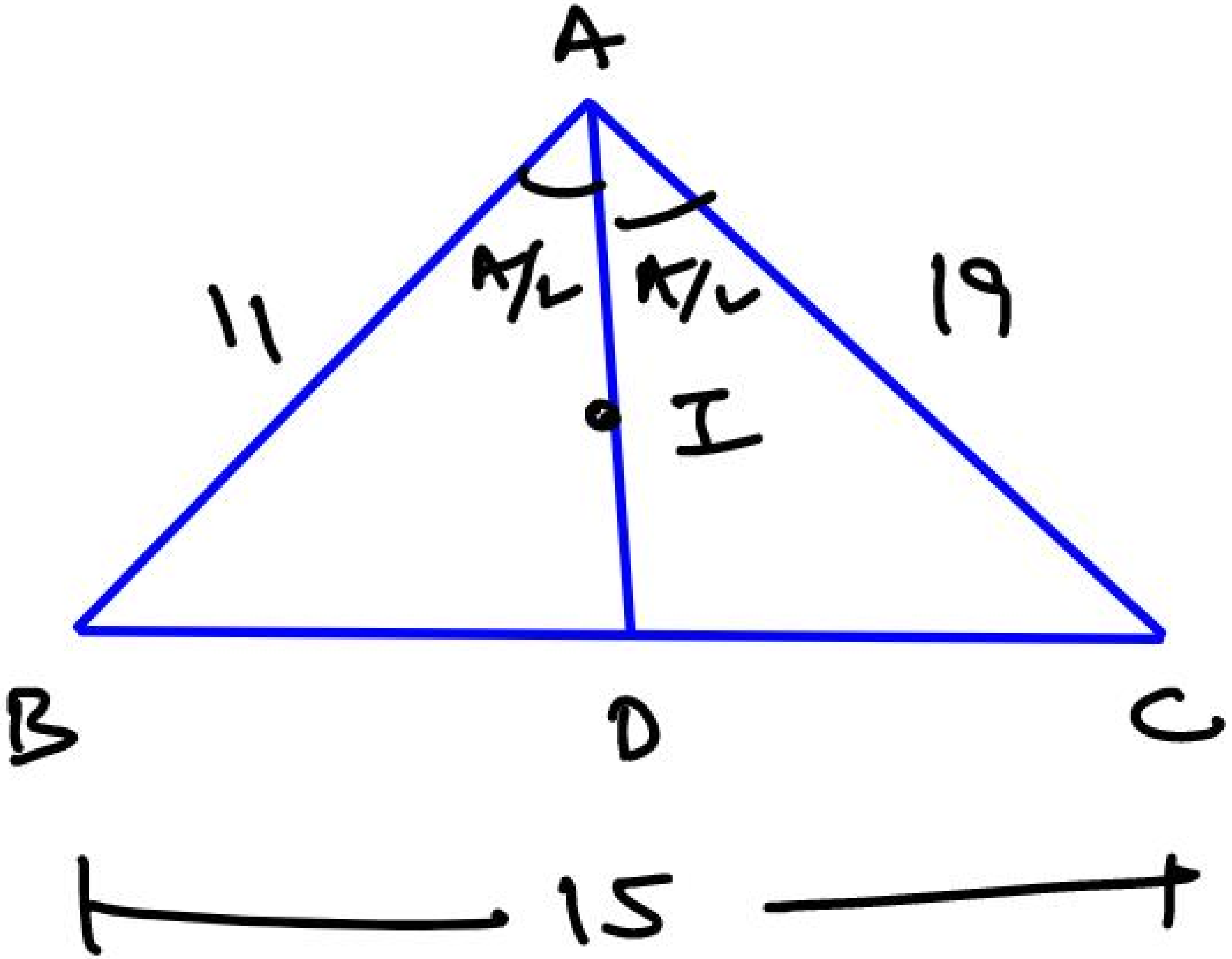
$$\frac{BA}{BD} = \frac{AI}{ID}$$

$$\frac{AB}{AC} = \frac{BD}{DC}$$

$$BD = \frac{ca}{c+b}$$

$$\frac{\cancel{c}(c+b)}{\cancel{c}a} = \frac{AI}{ID}$$

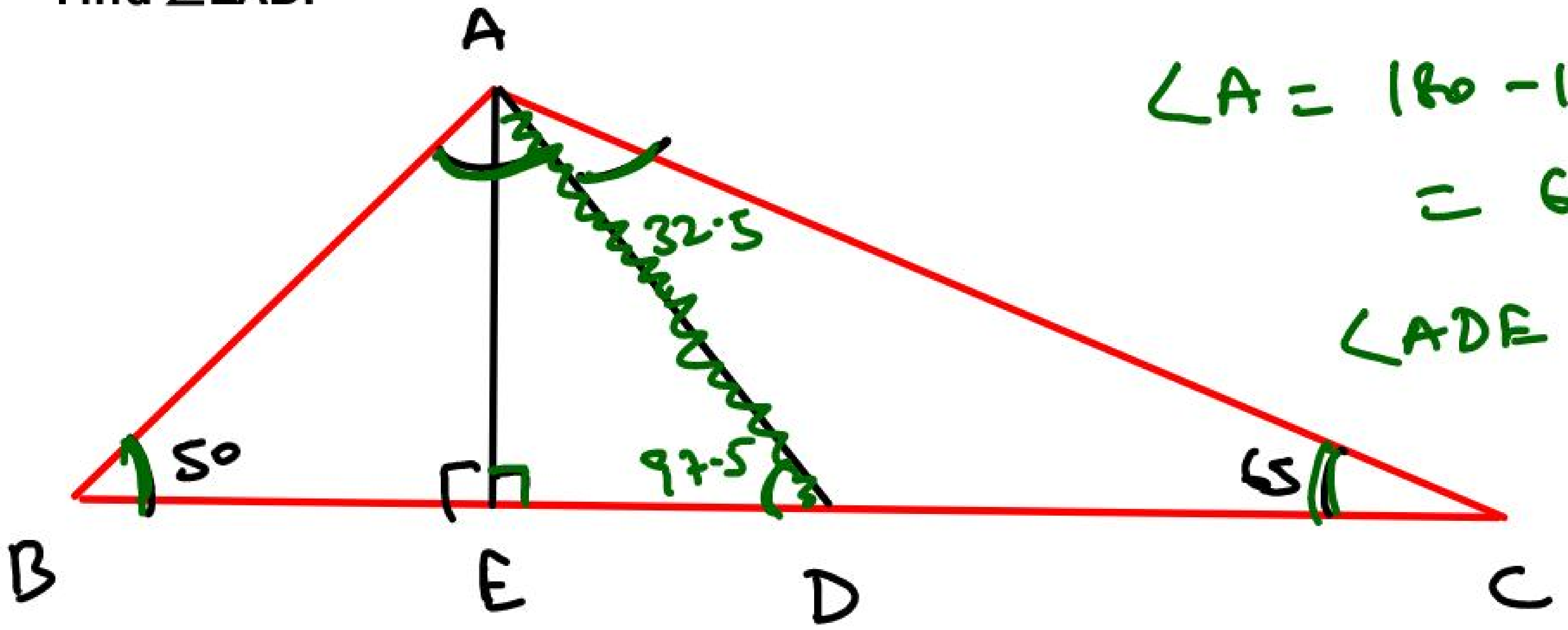
Eg9. In a ΔABC, AD is the angle bisector of $\angle A$ meeting BC at D.
If AB = 11 cm, BC = 15 cm and AC = 19 cm
Find AI : ID (where I is the incentre of ΔABC)



$$\frac{AI}{ID} = \frac{11+19}{15} = \frac{\cancel{30}^{\,2}}{\cancel{15}\;1}$$

Eg10. In a ΔABC, AE is perpendicular to BC and AD is the angle bisector of $\angle BAC$ meeting BC at E and D respectively. If $\angle B = 50$ and $\angle C = 65$.

Find $\angle EAD$.



$\angle A = 180 - 115$

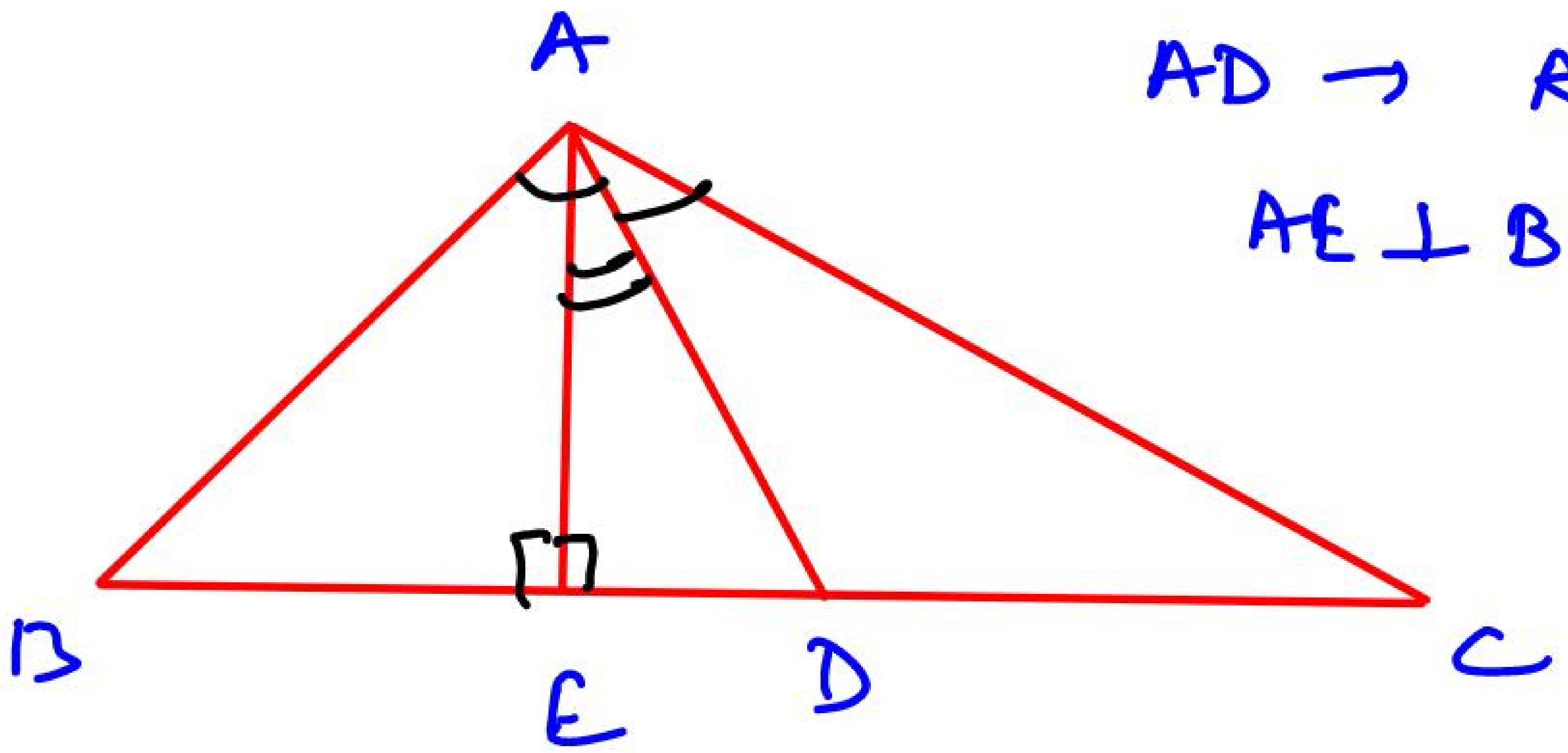
$= 65$

$\angle ADE = 97.5$

ΔADE

$97.5 + 90 + \angle EAD = 180$

$\angle EAD = -7.5$

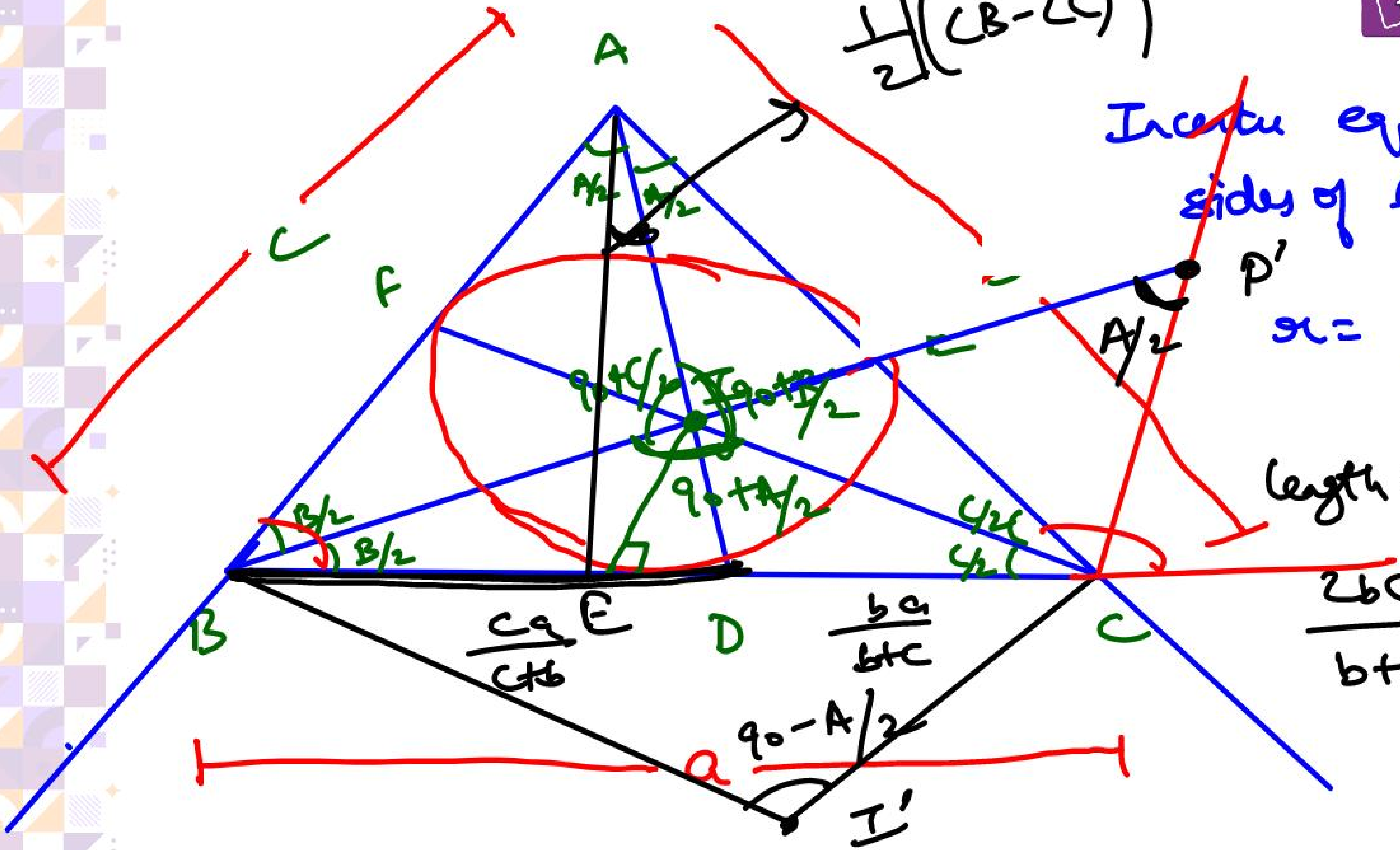


AD → Angle Bisector

$AE \perp BC$

$$\angle EAD = \frac{1}{2}\left|(\angle B - \angle C)\right|$$

$\frac{1}{2}(\angle B - \angle C)$



Incentre eq from sides of Δ

$r = \frac{Area}{s}$

length of AD

$\frac{2bc}{b+c}\cos A/2$

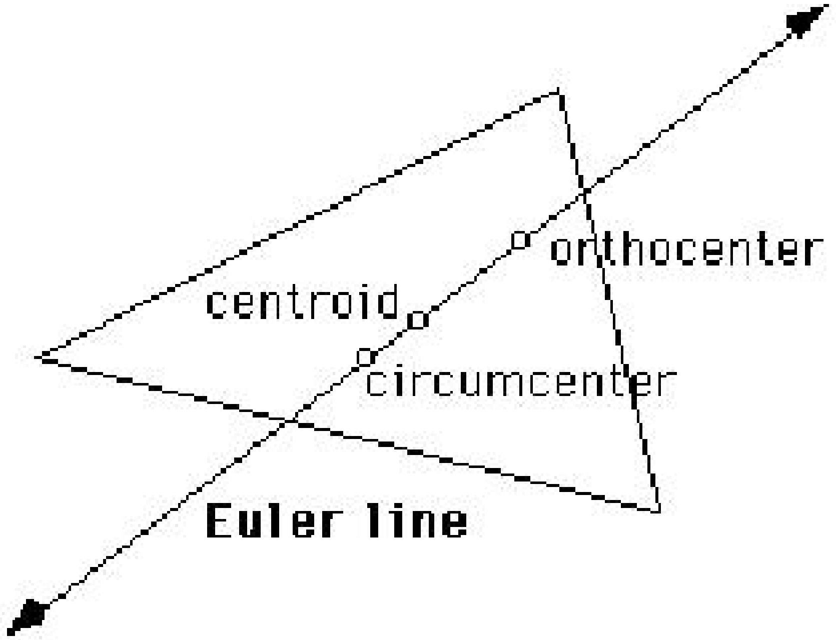
(1) In all Δ's O, G & C are collinear.

O	$\rightarrow$	Orthocentre
I	$\rightarrow$	Incentre
G	$\rightarrow$	Centroid
C	$\rightarrow$	Circumcentre

(2) In Isosceles Δ, O, G, C and I are collinear.

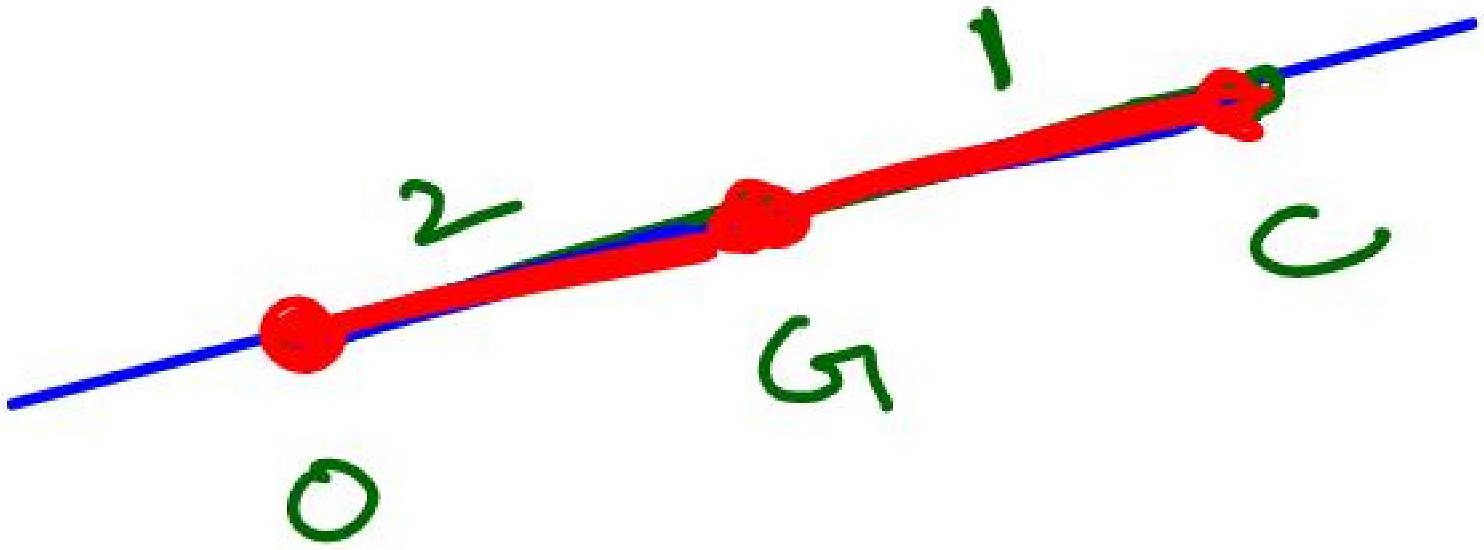
(3) In Equilateral Δ, O, G, C and I are coincide.

Euler's Line



Centroid divides the line segment which joins orthocentre & circumcentre in 2 : 1.

OG : GC = 2 : 1



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Distance between C and I

imp

$$D = \sqrt{R^2 - 2Rr}$$

where,

R → circumradius

r → inradius

$$R^2 - 2Rr \geq O$$

$$R^2 \geq 2Rr$$

$$R \geq 2r$$

$$\boxed{\frac{R}{r} \geq 2}$$

Equilateral Δ

$$\boxed{\frac{R}{r} = 2}$$

Distance between G and C

$$D^2 = R^2 - \frac{1}{9}\left(a^2 + b^2 + c^2\right)$$

Not Important

where,

R → circumradius

a, b, c are sides of Δ

PRACTICE QUESTIONS

Q1. By using line segments of length 2 cm, 4 cm, 6 cm, 7 cm and 8 cm the number of triangles that can be formed is :

(a) 2 (b) 3 (c) 4 (d) 6

Ans. (d)

Q2. The three sides of a triangle are 15, 25, x units which one of the following is correct.

(a) $10 < x < 40$

(b) $20 < x < 40$

(c) $30 < x < 40$

(d) $10 < x < 30$

Ans. (a)

Q3. If the three angles of a triangle are : $(k + 15)^\circ$, $\left(\frac{2k}{3}+30\right)^\circ$ and $\left(\frac{6k}{5}+6\right)^\circ$, then the triangle is :

(a) Scalene/विषमबाहु

(b) Equilateral/समबाहु

(c) Right angled/समकोण

(d) Isosceles/समद्विबाहु

Ans. (b)

Q4. In a right angled ΔABC, $\angle ABC = 90°$, BN is perpendicular to AC, AB = 6 cm, AC = 10 cm. Then AN : NC is-

(a) 3 : 4 (b) 9 : 16

(c) 3 : 16 (d) 1 : 4

Ans. (b)

Q5. A ΔABC of side 8, 10 and 12 cm respectively. If a median drawn to the longest side of triangle then find the length of that median.

(a) $\sqrt{38}$ (b) $\sqrt{42}$

(c) $\sqrt{46}$ (d) $\sqrt{50}$

Ans. (c)

Q6. If the length of medians of a traingle is 10, 12, 18 units, then find the area of triangle.

(a) $\frac{160}{3}\sqrt{2}$

(b) $\frac{158}{3}\sqrt{2}$

(c) $\frac{162}{3}\sqrt{2}$

(d) $\frac{164}{3}\sqrt{2}$

Ans. (a)

Q7. If the median drawn on the base of a triangle is half its base, the triangle will be,

(a) right-angled/समकोण

(b) Acute-Angled/न्यूनकोण

(c) Obtuse-angled/अधिक कोण

(d) Equilateral/समबाहु

Ans. (a)

Q8. In a right angled ΔABC, $\angle B = 90°$. AD and CE are two medians of the triangle meeting at F. The ratio of the area of ΔAFC and the quadrilateral EFDB is :

(a) 1 : 1
(b) 1 : 2
(c) 2 : 1
(d) 2 : 3

Ans. (a)

Q9. E is the mid-point of the median AD of a ΔABC. If BE produced meets the side AC at F, then CF is equal to :

(a) $\frac{AC}{3}$ (b) $\frac{2AC}{3}$ (c) $\frac{AC}{2}$ (d) None of these

Ans. (b)

Q10. AD is the median of ΔABC. Point E divides median AD into the ratio 1 : 2. BE is produced, which meets side AC at point F, then AF is equal to :

(a) $\frac{1}{3}AC$

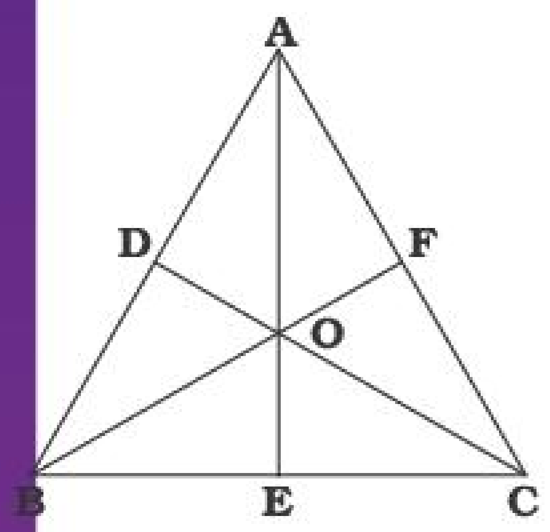
(b) $\frac{2}{3}AC$

(c) $\frac{1}{5}AC$

(d) $\frac{1}{2}AC$

Ans. (a)

Q11. In the given fig. O is the incenter of ΔABC. If $\frac{AO}{OE} = \frac{5}{4}$ and $\frac{CO}{OD} = \frac{3}{2}$ then what is the value of $\frac{BO}{OF}$?



(a) $\frac{19}{14}$ (b) $\frac{38}{17}$ (c) $\frac{38}{7}$ (d) $\frac{19}{7}$

Ans. (c)

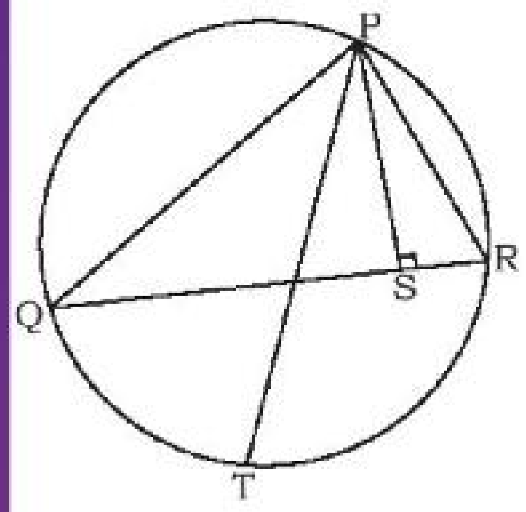
Q12. If I is the incenter of ΔABC and $\angle BAC$ $50°$, then $\angle BIC$ = ?

(a) 113 (b) 114

(c) 115 (d) 117

Ans. (c)

Q13. In the given figure, PQR is a triangle in which, PQ = 24 cm, PR = 12 cm and altitude PS = 8 cm. If PT is the diameter of the circum-circle, then what is the length (in cm) of circum-radius ?



(a) 15 (b) 18 (c)20 (d) 21

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Ans. (b)

Q14. O and C are respectively the orthocenter and circumcenter of an acute-angled triangle PQR. The points P and Q are joined and produccd to mcct thc sidc QR at S. If $\angle PQS = 60°$ and $\angle QCR = 130°$, then $\angle RPS =$

(a) 30° (b) 35°

(c) 100° (d) 60°

Ans. (b)

Q15. In a triangle which centres are colliner

(a) Incentre, Orthocentre, Circumcentre
(b) Orthocentre, Incentre, Centroid
(c) Orthocentre, Circumcentre, Centroid
(d) Centre are not necessary collinear

Ans. (c)

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Q16. If the ratio of sides of a triangle is 3 : 7 : 8. Then find the ratio of circumradius to inradius ?

(a) 7 : 3 (b) 7 : 2 (c) 35 : 12 (d) 12 : 35

Ans. (b)

Q17. If the sides of a triangle are 6 cm, 8 cm and 10 cm. Find the distance between circumcentre and incentre ?

(a) 2.5 cm (b) $\sqrt{7}$ cm (c) 4.5 cm (d) $\sqrt{5}$ cm

Ans. (d)

Q18. In a triangle the distance between centroid and orthocentre is 36 cm. Find the distance between centroid and circumcentre.

(a) 18 cm (b) 54 cm

(c) 9 cm (d) 27 cm

Ans. (a)

Q19. I and O are respectively the in-centre and circumcentre of a ΔABC. The line AI produced, intersects the circumcircle of ΔABC at the point D. If $\angle ABC = x°$, $\angle BID = y°$ and $\angle BOD = z°$ then $\frac{z + x}{y} = ?$

(a) 3 (b) 1 (c) 2 (d) 4

Ans. (c)

Q20. In a triangle ABC, $\angle A = 60°$, AB = 3 cm and AC = 4 cm. Find the length of AD, if AD is angle bisector.

(a) $\frac{12}{7}\sqrt{3}$ (b) $28\sqrt{3}$

(c) $\frac{7}{12}\sqrt{3}$ (d) $\frac{15}{7}\sqrt{3}$

Ans. (a)

Q21. In ΔABC point D, E and F divide the side AB, AC and BC in the ratios 1 : 3, 1 : 4 and 1 : 2 respectively. What is the ratio of the area of ΔDEF to the area of ΔABC.

(a) 1 : 6 (b) 1 : 12

(c) 1 : 3 (d) 3 : 8

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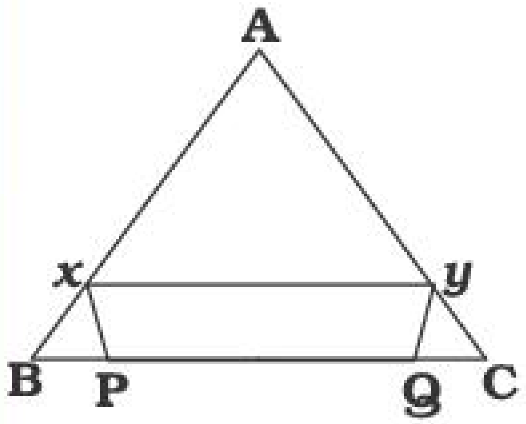
Ans. (a)

Q22. In the given figure, ABC is an equilateral triangle of side length 30 cm. xy is paralled to BC, xP is parallel to AC and YQ is parallel to AB. If (xY + xP + yQ) is 40 cm, tghen what is the PQ equal to ?



(a) 5 cm
(b) 12 cm
(c) 15 cm
(d) None of these

Ans. (d)

Q23. In an equilateral triangle, there is a point inside the triangle whose perpendicular distance from each side is $4\sqrt{3}$ cm, $7\sqrt{3}$ cm and $5\sqrt{3}$ cm respectively. Find side of the triangle.

(a) 16 (b) 48 (c) 32 (d) 8

Ans. (c)

Q24. In ΔABC, the bisectors of the internal angle $\angle B$ & external angle $\angle C$ intersect at D. If $\angle BDC = 60^\circ$ then $\angle A$ is

(a) 100° (b) 90° (c) 120° (d) 60°

Ans. (c)

Q25. In ΔABC, D is a point on BC such that DC = AC and $\angle BAC - \angle ABC = 20°$, $\angle BAD$ is :

(a) $10°$

(b) $15°$

(c) $30°$

(d) Cannot be determined

Ans. (a)

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Q26. D is a point on the side BC of a triangle ABC such that $AD \perp BC$. E is a point on AD for which AE : ED = 5 : 1. If $\angle BAD = 30°$ and $\tan(\angle ACB) = 6 \tan(\angle DBE)$, then $\angle ACB$=

(a) 15° (b) 60°
(c) 45° (d) 30°

Ans. (b)

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Q27. In ΔABC, $\angle C$ is an obtuse angle. The bisectors of the exterior angles at A and B meet BC and AC produced at D and E respectively. If $AB = AD = BE$, then $\angle ACB =$

(a) $105°$ (b) $108°$

(c) $110°$ (d) $135°$

Ans. (b)

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Q28. If semiperimeter of a right angle triangle is 120 cm and length of its smallest median is 56 cm then, find the area of triangle.

(a) $960\ cm^2$ (b) $720\ cm^2$

(c) $600\ cm^2$ (d) $560\ cm^2$

Ans. (a)

Q29. The sides of a triangle are in geometric progression with common ratio $r < 1$. If the triangle is a right angled triangle the square of common ratio is given by :

(a) $\frac{\sqrt{5}+1}{2}$ (b) $\frac{\sqrt{5}-1}{2}$ (c) $\frac{\sqrt{3}+1}{2}$ (d) $\frac{\sqrt{3}-1}{2}$

Ans. (b)

Q30. An isosceles triangle ABC is right angled at B. D is a point inside the triangle ABC. P and Q are the feet of the perpendiculars drawn from D on the side AB and AC respectively of ΔABC. If AP = a cm, AQ = b cm and $\angle BAD = 15^\circ$, $\sin 75^\circ$ =

(a) $\frac{2b}{\sqrt{3}a}$ (b) $\frac{a}{2b}$ (c) $\frac{\sqrt{3}a}{2b}$ (d) $\frac{2a}{\sqrt{3}b}$

Ans. (c)